ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

McGRAW-HILL COMPANY OF CALIFORNIA FEBRUARY, 1938 PRICE TWENTY-FIVE CENTS PER COPY

19TH Annual Review and Progress Number

SILENT
ECONOMICAL
and SAFE
Give Electrical Gifts this Christmas
ELECTRICAL GIFTS ARE MODERN · DURABLE · ACCEPTABLE · BEAUTIFUL · SMART
ECONOMICAL · USEFUL
A few suggestions from the many items now on display by YOUR ELECTRICAL DEALER
Red Tag
ELECTRIC RANGE
EVENT
You
an buy
an
ELECTRIC
RANGE
as low as
$2 or $3
a month
Widening
the
Appliance
Market
Edison Advertises
for the dealer . . .
Week after week Edison newspaper advertising directs its efforts toward building sales through regular retail channels. The familiar phrase "At Your Electrical Dealer" is a prominent feature of each advertisement; the convenience and helpfulness of his service to the public is constantly stressed. By thus strengthening the relationship between retailer and consumer, Edison renders a worthwhile service which has an important bearing on appliance sales.
HE MIGHT BE A GREAT ARTIST SOME DAY..
DEPENDABLE than a Modern ELECTRIC RANGE ?
get yours NOW
SEE YOUR DEALER
SOUTHERN CALIFORNIA EDISON COMPANY LTD.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

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"The All-Industry Magazine of Progress"

ELECTRICAL WEST

MEMBER AUDIT BUREAU OF CIRCULATIONS

WITH WHICH ARE CONSOLIDATED THE "ELECTRICAL JOURNAL," 'THE "JOURNAL OF ELECTRICITY, POWER & GAS," AND THE "JOURNAL OF ELECTRICITY"

ABP

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Established 1887

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Contents for February, 1938—Vol. 80, No. 2

Electra's Husband 35
Western Growth Tops Nation's—Annual Review 36
Setting the Goal for the Year Ahead 38
Engineering 44
Sales Parade 57
Appliance Sales Guide—Electric Water Systems 65
Lighting and Wiring 74
Editorial 76
Maintenance 78
News of the Industry 80
Where to Buy in the West 97

(Cover from a photograph by Westinghouse)

NEXT MONTH

Bonneville Dam, where the physically largest hydro-generators in the world are scheduled for service this year, will be the subject of a 16-page pictorial insert in the March issue of Electrical West. Like "Boulder Dam Power," the pictorial history published by Electrical West in 1936, the Bonneville feature will cover in sixteen pages of pictures the complete story of the project from ground-breaking to generation.

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Wayne Snowden, Engineering Editor . Stanley Schuler, Assistant Editor
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ELECTRICAL WEST

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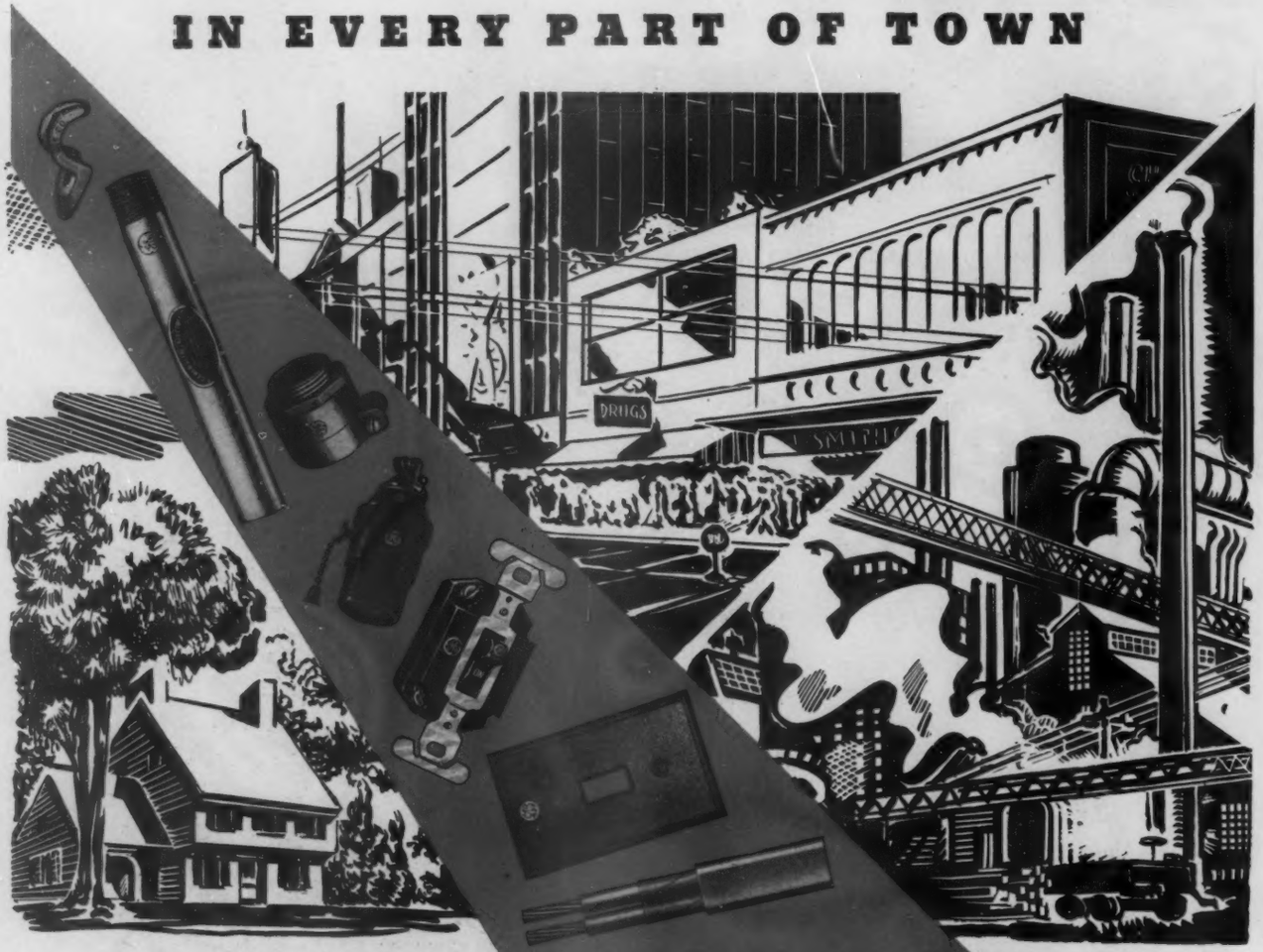
IN EVERY PART OF TOWN



G-E WIRING MATERIALS

FIT THE JOB

Whatever type of building you wish to wire, whether it be an office building, a factory, a home or a roadside stand, you'll find exactly the right wiring materials in the G-E line. These materials — conduit, wiring devices, wire and cable — all have the same uniform high quality and are designed to be used together. G-E Wiring Materials are economical, easy to install and assure long years of service.

For more information about General Electric Wiring Materials, see your nearest G-E Merchandise Distributor or write today to Section CDW-8212, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

GENERAL ELECTRIC

WIRING MATERIALS

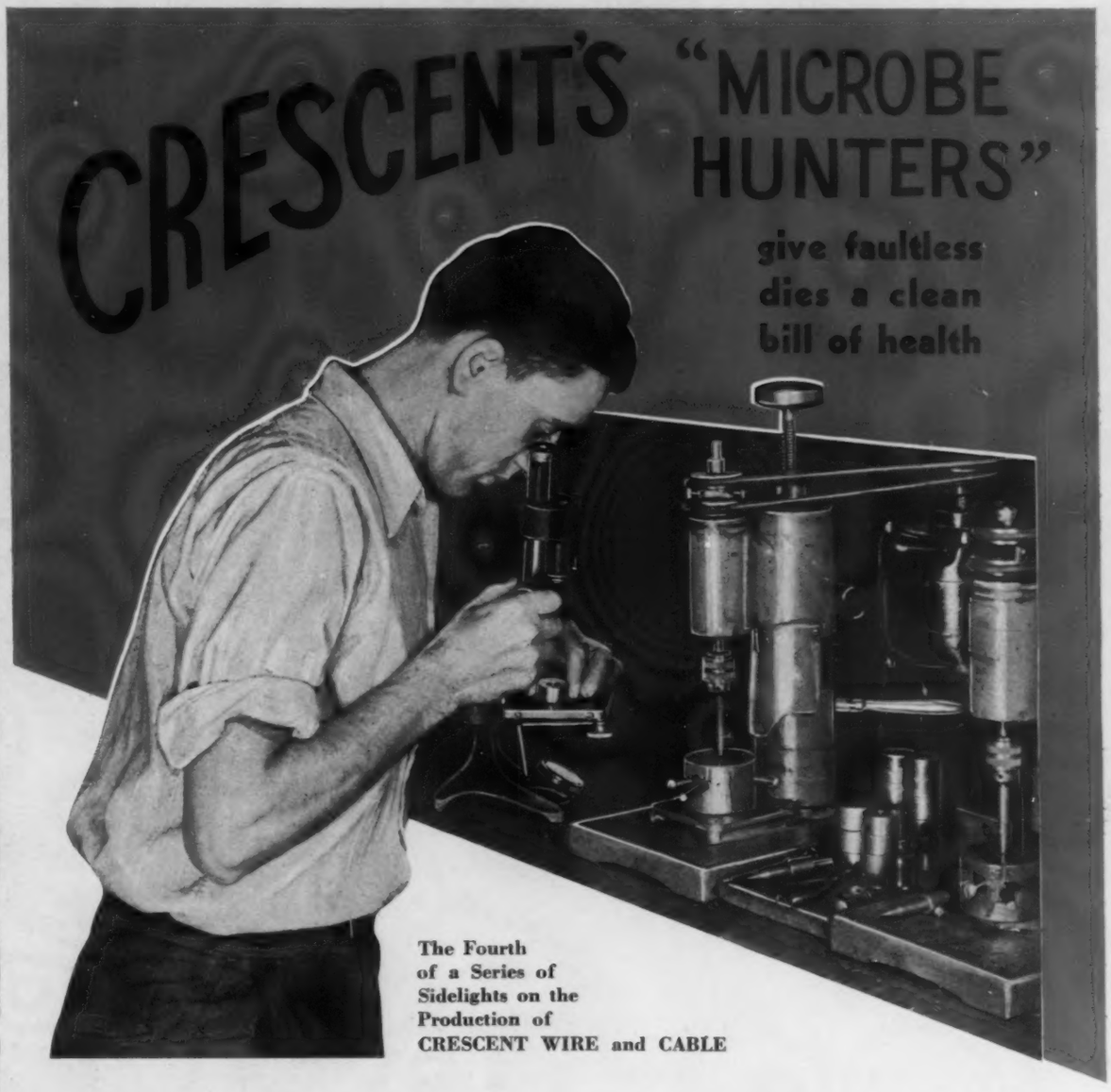
APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO WIRES • SIGNAL CABLE • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

CRESCENT'S "MICROBE HUNTERS"

give faultless dies a clean bill of health



The Fourth of a Series of Sidelights on the Production of CRESCENT WIRE and CABLE

Eagle eyes peering through this binocular microscope can detect the most minute flaws that tend to mar the finish or shape of dies used in drawing copper for Crescent Wire and Cable. And close at hand, is some of the precision sizing and polishing equipment necessary for the shaping and maintenance of tungsten carbide dies.

Such close control over all forming tools is a standing "must" order in the Crescent plant to insure accuracy and uniformity of wire and cable sizes.

CRESCENT INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY

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130 S. Hewitt St.

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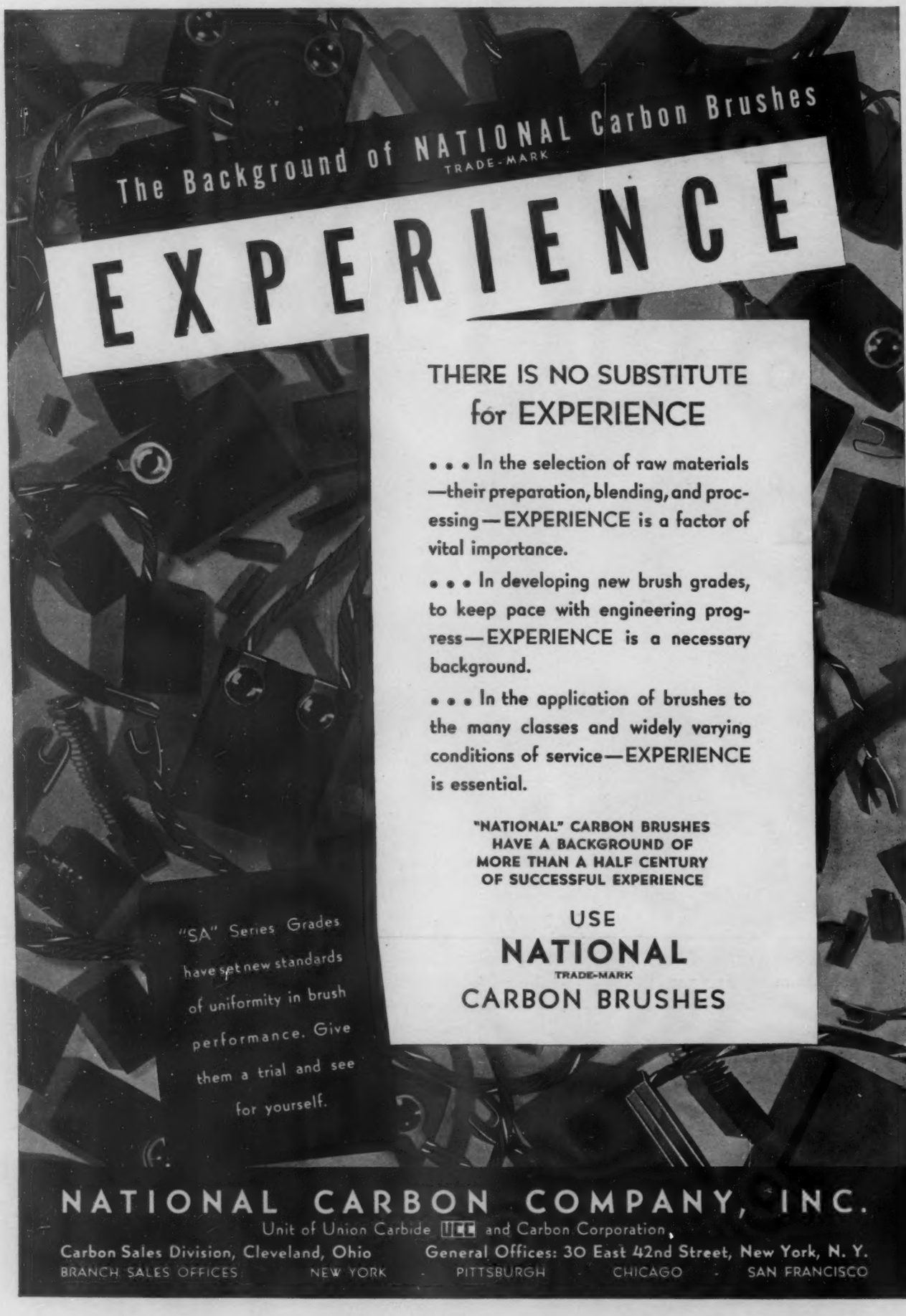
1264 Folsom St.

KANSAS CITY, MO.
W. F. Howe
526 Law Bldg.

CRESCENT ENDURITE SUPER-AGING INSULATION • WEATHER-PROOF WIRE


The Background of NATIONAL Carbon Brushes
TRADE-MARK
EXPERIENCE
THERE IS NO SUBSTITUTE
for EXPERIENCE
• • • In the selection of raw materials —their preparation, blending, and processing — EXPERIENCE is a factor of vital importance.
• • • In developing new brush grades, to keep pace with engineering progress — EXPERIENCE is a necessary background.
• • • In the application of brushes to the many classes and widely varying conditions of service — EXPERIENCE is essential.
"NATIONAL" CARBON BRUSHES HAVE A BACKGROUND OF MORE THAN A HALF CENTURY OF SUCCESSFUL EXPERIENCE
USE
NATIONAL
TRADE-MARK
CARBON BRUSHES
"SA" Series Grades have set new standards of uniformity in brush performance. Give them a trial and see for yourself.
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
Carbon Sales Division, Cleveland, Ohio
General Offices: 30 East 42nd Street, New York, N. Y.
BRANCH SALES OFFICES NEW YORK · PITTSBURGH CHICAGO · SAN FRANCISCO

Reproduction of G-E's Current 24-Sheet Poster

...AND G-E IS THE ONE TO SELL!!

Never before could you offer so much General Electric Refrigerator for the money! Never before have General Electric dealers had so much to *shout* about! New General Electric Triple-Thrift models are thriftier and have more convenience features than ever before. And they are popularly priced!

New quick-releasing, fast-freezing ice cube trays. Full-width sliding shelves, adjustable in spacing. New sliding drawers for fruit and vegetable storage. New stainless-steel super-freezer with removable shelf. One-button temperature control and defrosting switch. Thermometer. Interior Light. Chiller Tray. Matched set of refrigerator dishes. Water flask. Many of these advanced convenience features are standard on all 1938 models.

"Save Three Ways—through bigger dollar-for-dollar value—lower current cost—and long life"—*that's* what you can tell prospects about the new 1938 G-E Triple-Thrift Refrigerator! The G-E is first choice of millions. It's popularly priced. It's backed by 60 years of electrical experience—by greater sales support than ever—*plus* the acceptance value of the greatest name in electrical manufacturing. Last year America bought more General Electrics than ever before, and this year's G-E is even a bigger value than ever. That's the kind of a line to sell! See the G-E distributor TODAY.

General Electric Co., Specialty Appliance Division, Sec. DC2, Nela Park, Cleveland, Ohio

New! Quick Releasing Ice Cube Trays. Two cubes or a trayful in a jiffy!

Full Width Sliding Shelves, adjustable in spacing. Removable Split Bottom Shelf.

New! Sliding Drawers for storage and moisture-conditioning of fruits and vegetables.

Oil Cooled Sealed-in-Steel Monitor Mechanism assures quiet operation, low current cost and *enduring* economy.

GO TO TOWN
on the
MAINLINE
1938
General Electric Refrigerators, Ranges, Electric Sink with Dishwasher and Disposall, Water Heaters, Washers, Ironers, "Packaged" Commercial Refrigeration Products.
THE COMPLETE LINE OF ELECTRICAL HOME APPLIANCES
—every one proved by performance, tested by time. "Go to Town" on the Mainline in 1938. It's another G-E year!
General Electric Range with Tripl-Oven, Hi-Speed CALROD Cooking Units and many advanced features. 15 models—priced for every income.
General Electric Sink with Dishwasher and Disposall. Washes the dishes, disposes of food wastes—electrically. It's your next big sales opportunity!
GENERAL ELECTRIC

The Jobs you READ about
TRIBORO BRIDGE
Connecting three Boroughs of
NEW YORK CITY
TRIANGLE CONDUIT
SELECTED AGAIN!
TO SERVE SEVERE REQUIREMENTS
A Triangle Product Rewards the Buyer!
TRIANGLE CONDUIT & CABLE CO., Inc.
Horace Harding & Queens Blvds.
ELMHURST, NEW YORK CITY, N.Y.
PACIFIC COAST DIVISION
C. C. Hillis, Vice-President in Charge of Sales
390 Seventh St., San Francisco, California
NEXT ISSUE
The FIRST Building of the New York World's Fair
It MUST be right!

WARNING
HEAT WAVES AHEAD!

•

ENJOY BIGGER AND BETTER FAN PROFITS THIS YEAR WITH GENERAL ELECTRIC QUIET FANS, THE FASTEST-SELLING LINE OF QUALITY FANS!

•

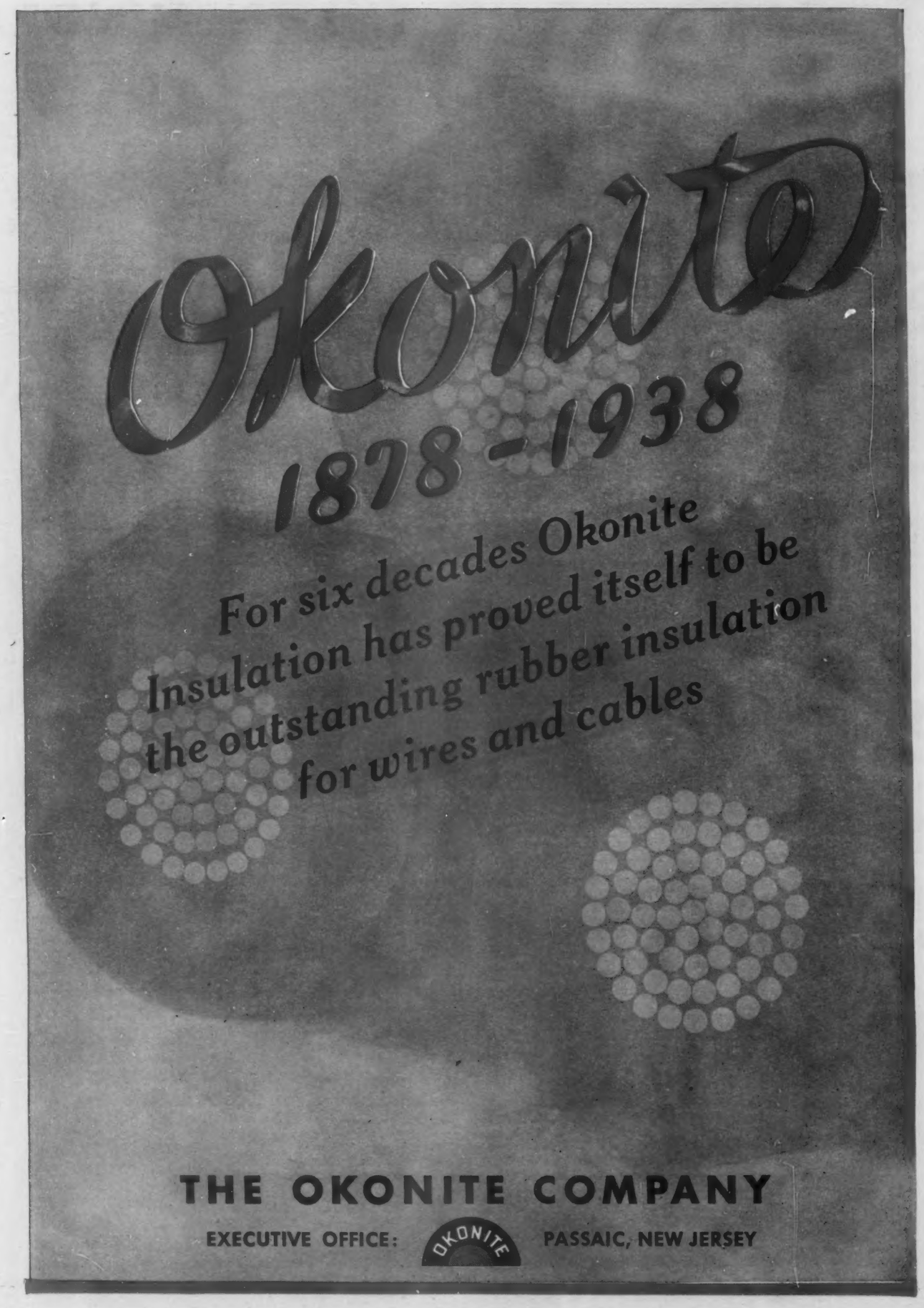
YOU'LL HAVE NEW FANS—QUIETER AND MORE EFFICIENT THAN EVER—AND NEW SALES PROMOTION AND ADVERTISING HELPS—MORE NUMEROUS AND BETTER THAN EVER!

•

ASK YOUR DISTRIBUTOR'S SALESMAN FOR COMPLETE DETAILS. YOU'LL PROFIT BY IT!

GENERAL ELECTRIC FANS

APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT


Okonite
1878 - 1938
For six decades Okonite
Insulation has proved itself to be
the outstanding rubber insulation
for wires and cables
THE OKONITE COMPANY
EXECUTIVE OFFICE:
OKONITE
PASSAIC, NEW JERSEY

3 SIZES OF THE *New* HEMINGRAY SERIES-600 INSULATORS

handle most PRIMARY distribution line requirements

3 SIZES

TYPE 660—FOR VOLTAGES UP TO 8,000
TYPE 670—FOR VOLTAGES UP TO 10,000
TYPE 680—FOR VOLTAGES UP TO 15,000

Handle most PRIMARY line requirements

● These new series-600 insulators provide high-leakage distance and insure long, trouble-free performance at moderate cost. Modern design, coupled with tough Hemingray electrical glass, plus new standards of accurate manufacture, result in greatly improved insulator performance.

Try these better insulators on your next job—learn why their use on your primaries will mean lower initial and over-all costs. Send today for samples. Owens-Illinois Glass Company, Hemingray Division, Muncie, Indiana.

•
BRASS-BUS
FOR TO
PERFORMA
•

FOR MODERN POWER LINE INSULATION

Order HEMINGRAY Glass INSULATORS

Proved
The World's Highest Authority on Product Performance
...IS ANY ONE OF YOUR CUSTOMERS! Probably she never saw a real, live electrical engineer in action. She never went through a testing laboratory. But she knows what a product for which she paid her good money should do IN HER KITCHEN OR HOME.
All over the world these Westinghouse users have been putting Westinghouse appliances through the most rigorous home tests — practical operation under all the ordinary and extraordinary conditions of actual use. They have recorded their experiences, their savings, their operating expenses, their suggestions, EVERYTHING! These records — these facts, all unadorned, are "Kitchen-proved" SELLING FACTS, Westinghouse retailers are using with truly amazing results.
Actual users give Westinghouse retailers their powerful selling story — give Westinghouse advertising its pertinent and penetrating messages. These users, in effect, are writing the booklets, the sales manuals, the product literature. After all, THEY ARE THE WORLD'S HIGHEST AUTHORITIES ON PRODUCT PERFORMANCE — AND EVERY PROSPECT KNOWS IT!
If this modern, sensible way of testing and selling electrical merchandise appeals to you, ask your Westinghouse man for additional facts; or write direct to Dept. 845. WESTINGHOUSE ELECTRIC & MFG. CO. MERCHANDISING DIVISION, MANSFIELD, O.
VERY HOUSE NEEDS
Westinghouse

...where they're used..

by the women who use them!

Kitchen-proved
Electric Refrigerators

Kitchen-proved
Electric Ranges

Kitchen-proved
Electric Dishwashers
Electric Roasters

Home-proved
Electric Water Heaters

Home-proved
Electric Washers
and Ironers

"The Line of Least Resistance

KITCHEN-PROVED!

WESTINGHOUSE Electric RANGES

COOK FAST

COOK BETTER

SAVE MONEY

NO OTHER

Electric Range offers the Selling advantages of these two exclusive Westinghouse features

The kitchen is where you use it. The kitchen is where we proved it. Now the certified *Kitchen-proof* is in — from 103 typical U. S. homes. It's proof that the COROX ECONOMIZER UNIT and the WESTINGHOUSE SUPEROVEN *cook fast, cook better, save money!*

STEP OUT TO LEADERSHIP

...th the Most Valuable FRANCHISE in Range History!

...ore and Make More with This "Hot L..."

Wipe it with a damp cloth and IT'S CLEAN! Only Westinghouse offers this 4-Heat COROX ECONOMIZER with one-piece solid top. It gives the *right* heat for every cooking operation, including a super-economical "simmer," using 60% less current than "low" on ordinary units.

Perfect broiling is easy — and smokeless — in a WESTINGHOUSE SUPEROVEN. The convenient top heater ends stooping and squatting. Biscuits in 10 minutes — *from a cold oven start!* Only the scientifically balanced heat gives perfect baking so fast. Exclusive Heat-Evener insures juicy, tender roasts.

SWING AHEAD

with Westinghouse in 1938!

...Your ... Sell ... More and Make More with This "Hot ..." in 1938 ...

1. When you sell a ...inghouse Range ... that the "bugs" are out — that your profit isn't upset by costly service calls. YOUR PROFIT STAYS IN because Westinghouse — with 34 years of electric range experience — knows how to build ranges right.

2. The 10-model Westinghouse line is COMPLETE — a model for every home, a price for every purse. You sell *profitably* in every price class.

3. *Kitchen-proved* features — COROX ECONOMIZER and the SUPEROVEN — make selling easy because they give the super-performance women demand today. And the *Kitchen-proved* facts are turned on your prospects with full force through a powerful national advertising program.

4. You skim the "profit cream" because the exclusive Local Proving Kitchen Plan is punch-packed with localized advertising and backed by every kind of promotional help.

Sign nothing — promise nothing — until you have seen the 1938 Westinghouse *Kitchen-proved* Ranges, the ranges that SELL FAST ... SELL BETTER ... BOOST PROFITS.

Write or wire Dept. 8109, Westinghouse Electric & Mfg. Co., Mansfield, O., or get in touch with your Distributor today for full details about the Westinghouse Range Franchise.

Westinghouse *Kitchen-proved* Ranges

EVERY HOUSE NEEDS WESTINGHOUSE

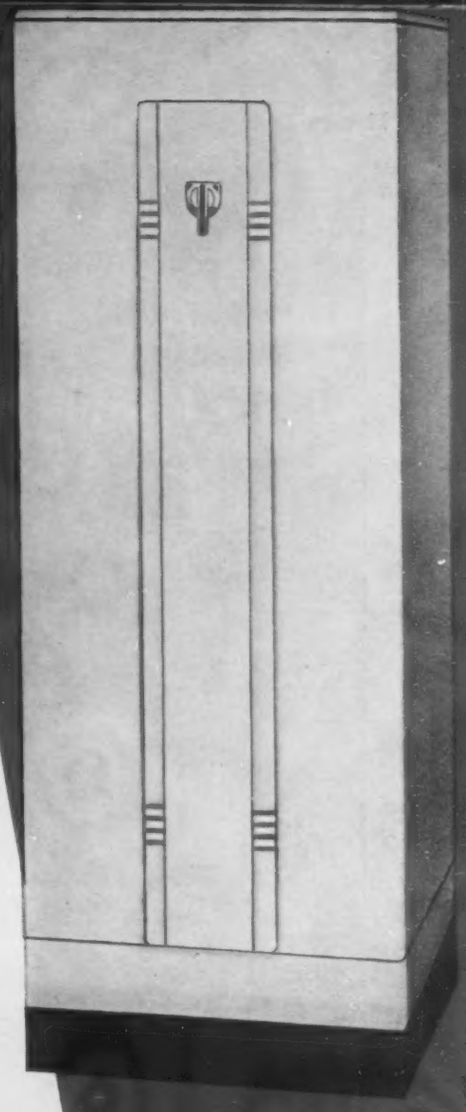
A NEW SLANT

ON *Electric* WATER HEATER SELLING

NOW REAL HOT WATER SERVICE *HOME-PROVED*

EASY QUICK CHEAP

JUST LIKE ELECTRIC LIGHT!



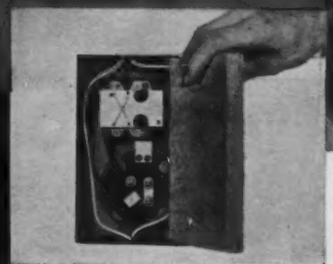
The home is where the water heater is used. And from the home comes sales-making proof of Westinghouse performance! Typical American families checked cost, performance, convenience . . . in their own homes. Now certified reports provide a profit-building selling story: *Home-proof* that Westinghouse Water Heaters give real hot water service — easy, quick, cheap — just like electric light!

Find out how A NEW SLANT will help you! See your nearest Westinghouse man, or write Dept. 8101, Westinghouse Electric & Manufacturing Co., Merchandising Division, Mansfield, Ohio.

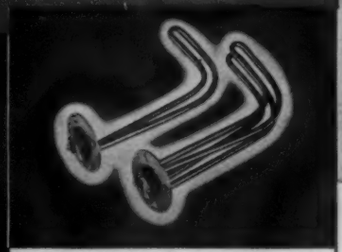
THIS EXCLUSIVE COMBINATION OF HOME-PROVED FEATURES MAKES IT EASIER TO SELL WESTINGHOUSE ELECTRIC WATER HEATERS AND

BOOST YOUR PROFITS!

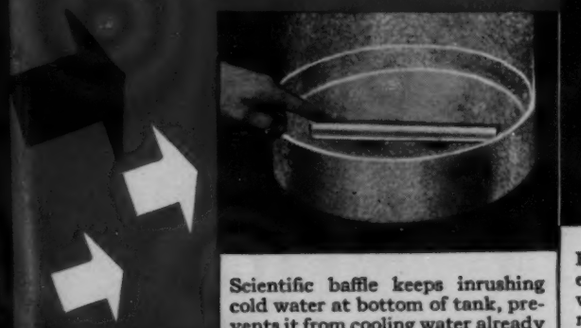
Extra-thick Palco Wool insulation keeps water hot for longer periods while no electricity is used. Cuts water heating costs.



Superaccurate thermostats turn electricity on when water is cool; off when it's hot. Save money, end work and worry.



Exclusive Corox Units transfer every bit of heat directly into the water — heat more water for less money.



Scientific baffle keeps inrushing cold water at bottom of tank, prevents it from cooling water already heated.

W WESTINGHOUSE ELECTRIC

Westinghouse *Home-proved* Water Heaters

EVERY HOUSE NEEDS WESTINGHOUSE

NOT ONLY A GREAT
LINE OF BEAUTIFUL
1938 ELECTRIC RANGES...

BUT ALSO

1938 Kelvinator

A GREAT PLAN TO SELL THEM!

Read what Kelvinator is doing to give you a better year . . . on Watt-Watcher Electric Cookery Sales

YOUR OWN PEOPLE EXPERTS ON ELECTRIC RANGES!

1 A capable home economist trains them in demonstrating "Watt-Watcher" Electric Cookery.

YOUR SALESPEOPLE BETTER EQUIPPED TO SELL!

2 Kelvinator provides practical sales-training courses for your salespeople . . . how to find prospects . . . approach them . . . close sales . . . developed with the help of successful Kelvinator salesmen.

FREE FILMS FOR PROSPECTS!

3 Kelvinator furnishes sound slide films that tell the advantages of Kelvinator "Watt-Watcher" Electric Cookery, in a way no woman can forget. Easy to show in your store.

TAKES THE STORY HOME AND INTO THE KITCHEN!

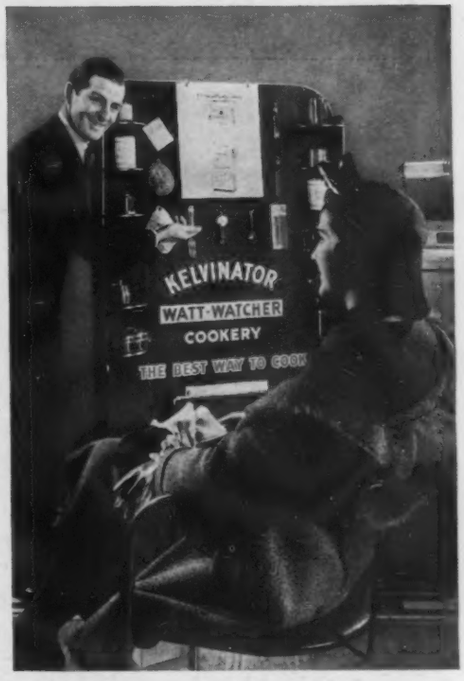
4 Kelvinator has a "visualizer" for you that does a remarkable job of getting the story over, RIGHT IN THE PROSPECT'S HOME.

PLUS THE GREATEST SALES HELP OF ALL!

5 For 1938, Kelvinator has developed the amazing "KONVINCE-HER" . . . an entirely new and exciting selling tool, suitable for individual or group demonstrations, that brings customers to your store . . . brings in sales.

Get the whole story of the Kelvinator line and the Kelvinator program for 1938. Phone your distributor. Or write now to:

KELVINATOR, Division of Nash-Kelvinator Corp., Detroit, Mich.



CALLED THE "KONVINCE-HER"... *and it does! Nothing else like it . . . world's grandest device to NAIL DOWN the story of electric cookery and Kelvinator Electric Ranges. Creates talk . . . pulls in prospects . . . helps* close! *Learn about it—now!*

Electric Ranges

THIS ELEMENT "Makes" the WIDE-LIMIT METER

THE driving element of the G-E Type I-30 watthour meter, more than any other feature, makes possible the straight-line characteristics between the wide-apart limits of 0.5 and 60 amperes.

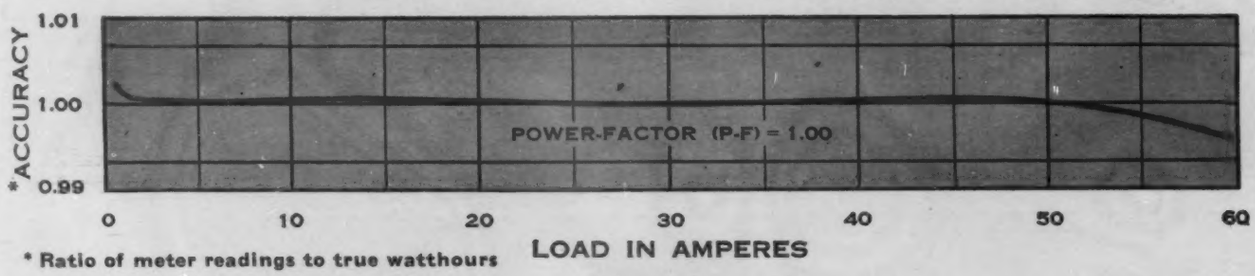
First of all, the I-30 meter—even when uncompensated—is remarkably accurate. It is the driving element that contributes most to this inherent accuracy. As a result of its fundamentally correct design, the errors caused by variations in load, voltage, temperature, power-factor, and frequency are negligible, and only slight compensations are needed.

The load shunt, which is incorporated as a part of the driving element, not only compensates for heavy-load droop, but also improves performance at light loads, so that the resulting load curve is accurate to lower values of current.

Other refinements in design—such as new light-load and lag adjustments and compensation for Class 1 and Class 2 temperature errors—add to the ability of the I-30 meter to handle accurately loads that vary widely, and help toward making it suitable for very broad applications.

If you should like to know more about the I-30, we shall be glad to send a copy of Bulletin GEA-2721. Or you may prefer to call in a G-E meter specialist. Address the nearest G-E sales office, or General Electric Company, Dept. 6—201, Schenectady, New York.

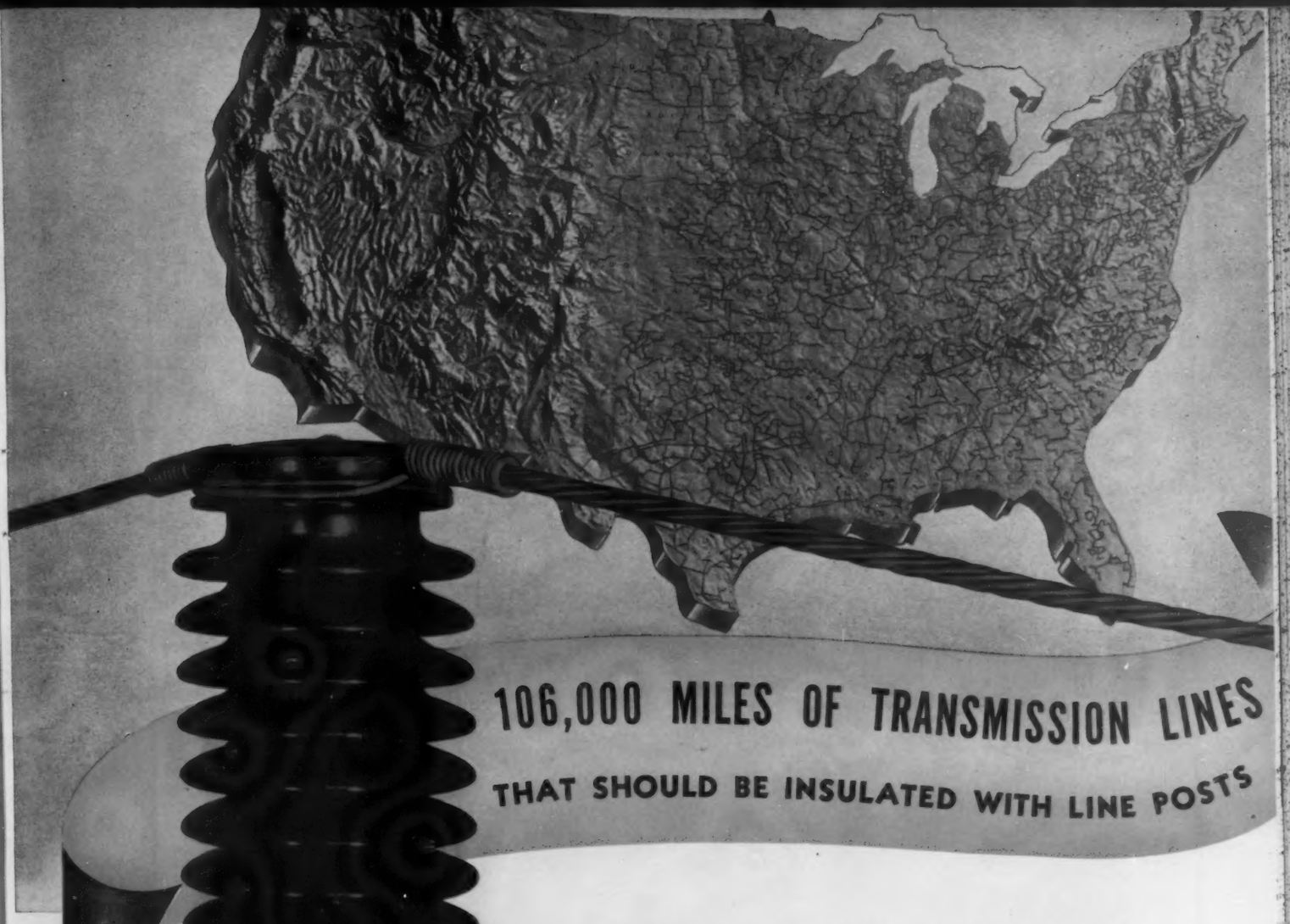
AVERAGE LOAD CURVE OF 15-AMPERE, 240-VOLT, 3-WIRE, 60-CYCLE, TYPE I-30 WATTHOUR METER



* Ratio of meter readings to true watthours

GENERAL ELECTRIC

400-29



106,000 MILES OF TRANSMISSION LINES

THAT SHOULD BE INSULATED WITH LINE POSTS

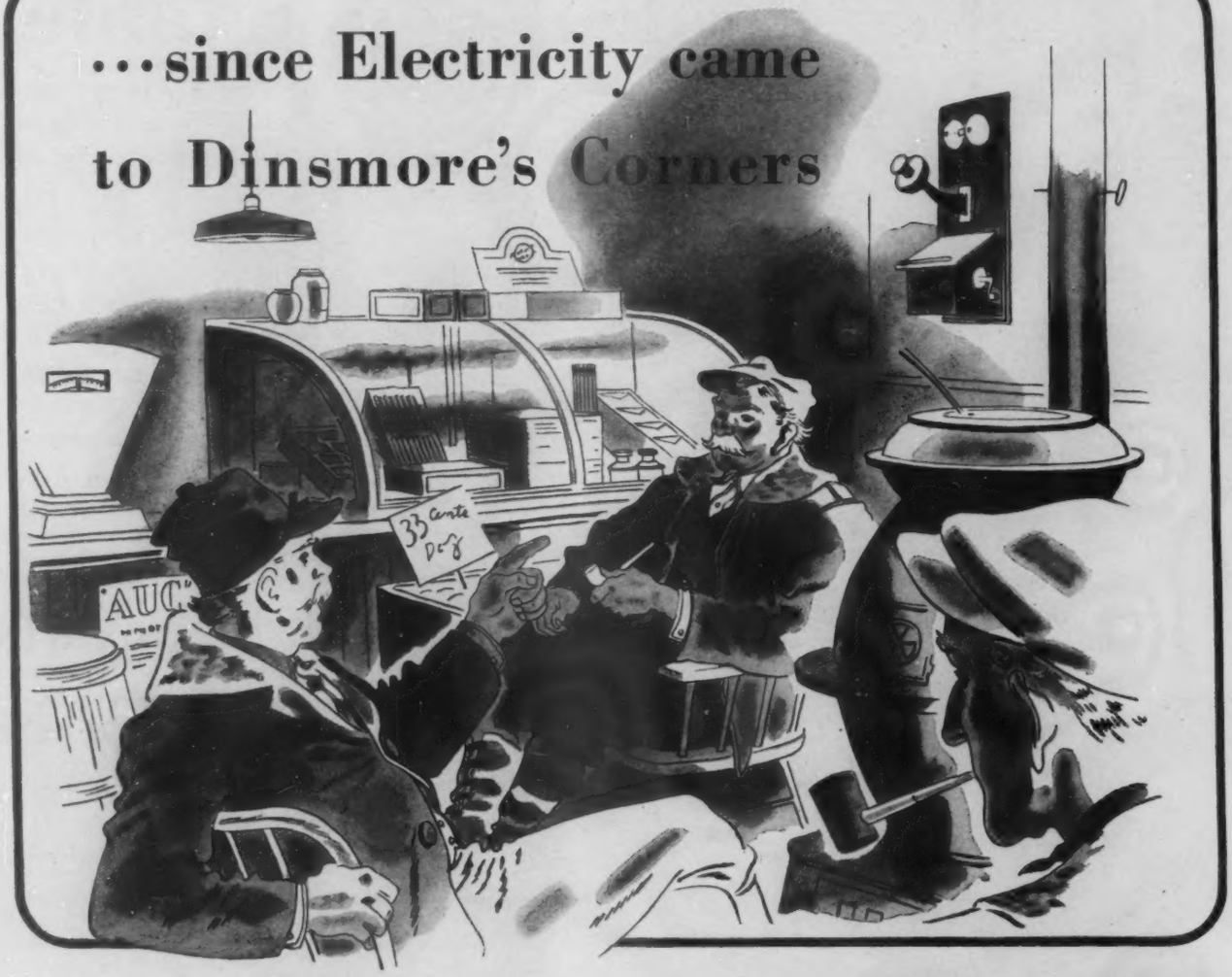
Year by year the power industry extends the scope of its service, bringing the conveniences, efficiencies and economies of electricity to more and more homes and industries. Today more than 106,000 miles of transmission lines, 27 Kv to 66 Kv, enmesh the country. And on the insulators carrying those lines is a heavy responsibility—a responsibility for carrying the load, day and night, through sun and storm, without failure, and at a minimum of cost. That is the performance you can expect from Line Posts. Construction costs are lower, failures fewer, maintenance less. If some of the three or four thousand miles of new transmission line scheduled for construction within the next year is yours, it will pay you to investigate Line Post advantages and economies.

LAPP INSULATOR CO. INC

LAPP INSULATORS

LE ROY - N.Y. - U.S.A.

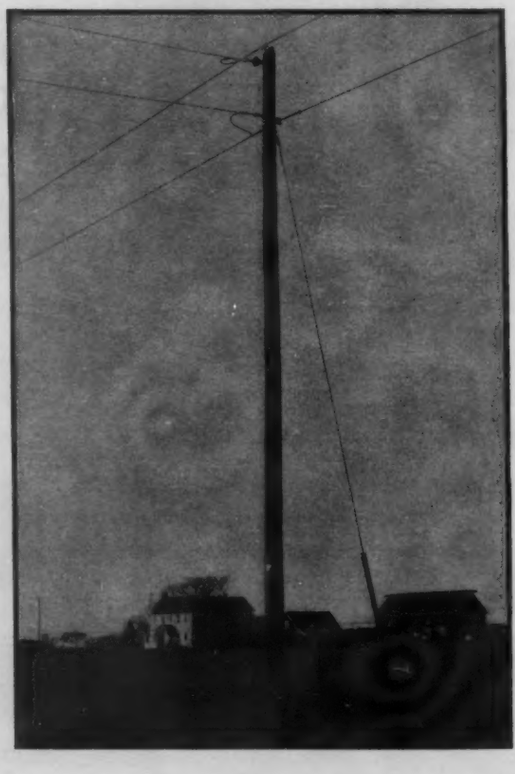
...since Electricity came to Dinsmore's Corners



They're still marveling at the way those power lines went up. Diggers and pole setters moving rapidly across country; wire-stringing crews on the job a few days later. And, *presto*, this once isolated section of rural America has electricity!

That's the way it goes when you're building a line with A.C.S.R. Up quickly and easily, and up to stay.

Aluminum Cable Steel Reinforced combines in a single conductor the light weight and conductivity of Aluminum and the strength of an unusually strong steel core. A.C.S.R. standards include methods and devices proved by thousands of tests, by years of actual service. Data of value to design engineers and construction men will be supplied gladly upon request. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh, Pennsylvania.



A·C·S·R

FOR RURAL LINE

FOR POWER TRANSMISSION

ALCOA

Economical-dependable

Long years of service on many important systems have demonstrated the economy and dependability of Locke pole line hardware.

These desirable qualities are constantly assured by rigid factory specifications and control. When your lines are built with Locke insulators and Locke pole line hardware you can be sure of speedy construction, low maintenance and long satisfactory life.

Do you have a copy of our catalog? If not, we'll be pleased to send you one. The up-to-date materials it illustrates may suggest new economies to you.

manufactured exclusively by

Seyler

MANUFACTURING COMPANY
PITTSBURGH PENNSYLVANIA

LOCKE
POLE LINE
HARDWARE

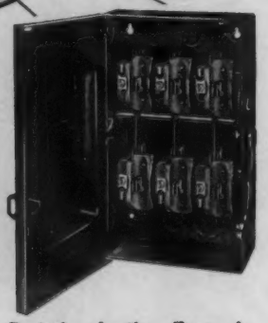
LOCKE INSULATOR CORPORATION
SHARPSBURG P. O., PITTSBURGH, PENNSYLVANIA

The snug row of switches shown above effectively illustrates the close-banking features of Colt-Noark Safety Switches. Space required between cabinets has been reduced to an absolute minimum through the use of the newest type Colt-Noark operating handle. Flat in design, it allows the switches to be banked within an inch of each other . . . conserving valuable space . . . bringing the installation into a compact group . . . and making for greater efficiency and convenience.

Colt-Noark Quadbreak and Dualbreak Safety Switches guarantee top notch performance . . . as well as complete safety, long life and attractive appearance.

May we send you our complete catalog . . . with detailed information?

The unit shown above is a Type A 250-Volt Dualbreak Safety Switch . . . with Quick Make, Quick Break, interlocking cover . . . and flat type operating handle. Type C Switches in 575 Volts also feature flat type handle.



Typical of the Type A 575-Volt Quadbreak line is the switch shown above . . . with four breaks in each leg to reduce arcing to a minimum . . . Quick Make, Quick Break, interlocking cover . . . and flat type operating handle.

COLT'S PATENT FIRE ARMS MFG. CO., Electrical Division, HARTFORD, CONN.

100 Years of Manufacturing Experience is back of every Colt Built Product

COLT-NOARK

SWITCHES INDUSTRIAL CONTROL EQUIPMENT FUSES

Boston
New York
Chicago
Philadelphia

SERVICE Entrance and Drop Cables made by the American Steel & Wire Company have been designed to reduce the cost of service change-overs involved in the installation of ranges and other appliances in homes, and to eliminate current diversion.

Our "Tamperproof" types have a concentric bare neutral conductor applied over the insulated conductors which makes it difficult to divert current without causing a short circuit between the inner and outer conductors when the cable is cut. The "Tamperproof" types (SD and SE) are approved by Underwriters for circuits not exceeding 150 volts to ground.

Type ASE is designed primarily for use under conditions where the Code calls for an entrance cable of the "protected" type. Type USE, for underground entrances, can be buried direct in earth without ducts or other external protection. Type ASE is also approved for this same purpose.

For full information on our Service Entrance and Drop Cables write for Bulletins No. 102 and 104.

SERVICE ENTRANCE *and* DROP CABLES

COLUMBIA STEEL COMPANY · *San Francisco*

Pacific Coast Distributors of products manufactured by the American Steel & Wire Company

United States Steel Products Company, New York
Export Distributors

UNITED STATES STEEL

Check this WESTON Photronic Equipment... against your own photoelectric needs

✓ COUNTING
✓ SORTING
✓ WEIGHING
✓ PHOTOMETRY
✓ RESEARCH
✓ CONTROL

✓ **Photronic Cell**—The basic element behind WESTON Photronic equipment . . . simple, stable, dry type cell . . . rapid in response . . . generating sufficient energy to operate relays direct.

✓ **Sensitive Relays**—Positive operation on values down to 2 microamperes or ½ millivolt . . . "off-on" and indicating types, designed especially for Photronic-powered equipment. Companion *Power Relays* permit control of major circuits.

✓ **High-Sensitivity Instruments**—A complete line of DC panel instruments and portables, calibrated in microamperes or comparable units . . . for accurate measurement in Photronic circuits.

✓ **Industrial Control Equipment**—Light source, Photronic Cell and Relay Panel combinations for counting, timing, and general industrial control. Will operate "off-on" relays at speeds up to 500 light-beam interruptions a minute.

✓ **Illumination Meters and Controllers**—Foot-candle meters . . . the standard instruments for illumination level tests in industry and the home. Special high-sensitivity instruments for photometric research . . . Photronic Controllers which turn lights on and off at predetermined levels.

✓ **Photometric Potentiometer and Control Unit**—The latest step in high-speed, high-sensitivity control . . . provides positive operation of recorders and relay controls.

WHETHER your needs arise in the field of photometry, of modern industrial control, or in some special field where light must be converted to an electrical response, it will pay you to check with WESTON.

Thanks to the WESTON Photronic Cell, illumination levels have become understandable to the public, and light beams have become serviceable to industry. Today, this same cell is the basic element for an increasing number of Photronic-powered units for measurement and control... units engineered by WESTON to expand the practical usefulness of the photoelectric effect.

Perhaps one of the standard Photronic cell-and-relay combinations can provide a simple and direct answer to your particular problem. Or perhaps some individual assembly of relays or instruments designed specifically for Photronic circuits holds the key.

In any event, the same WESTON engineers who have brought the usefulness of Photronic equipment to its present point are still at your service. Their counsel may bring to light new possibilities; it may keep you from duplicating old errors. Simple or complex, if there is a photoelectric solution to the problem you have in mind, WESTON can help you solve it. Weston Electrical Instrument Corporation, 577 Frelinghuysen Avenue, Newark, New Jersey.

*PHOTRONIC—*A registered trademark designating the photoelectric cells and photoelectric devices manufactured exclusively by the Weston Electrical Instrument Corporation.*

WESTON *Instruments*

PACIFIC COAST REPRESENTATIVES

Eicher & Bratt,
263 Colman Bldg.
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A. A. Barbera,
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A New Luminaire BORN TO SELL!

BEAUTIFUL
EFFICIENT

B-50

A FEW USERS OF PERMAFLECTOR LIGHTING

Apartment Buildings	Food Markets
Art Galleries	Furniture Stores
Automobile Dealers	Furriers
Banks	Gymnasiums
Beauty Shops	Hotels
Churches	Jewelers
Clothing Stores	Museums
Dairy Stores	Newspapers
Department Stores	Office Buildings
Five and Ten Cent Stores	Public Buildings
	Schools
	Stock Exchanges
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These people are YOUR prospects.

YOU will discover new opportunities for increased profits in this new Permaflector Luminaire that has everything—EYE APPEAL, PERFORMANCE APPEAL, and PRICE APPEAL.

The sleek flowing lines assume a simple pleasing shape that reflects the spirit of this streamline age. Its lasting beauty and adaptability to any interior will please your prospects instantly, and make sales easier.

This luminaire is equipped with a Permaflector which provides permanent, efficient distribution of light that will build satisfied customers and repeat orders.

Simple design and economy in manufacturing methods enable you to offer this unit at an extremely low price that is in line with present day budgets.

Write or send the coupon below for complete details of construction and installation.

PITTSBURGH REFLECTOR CO.

Pittsburgh, Pennsylvania — Representatives in 28 Cities

PERMAFLECTOR *Lighting*

PERMAFLECTORS · LUSTROLIERS · LUMINAIRES · SPOTLIGHTS · URNS
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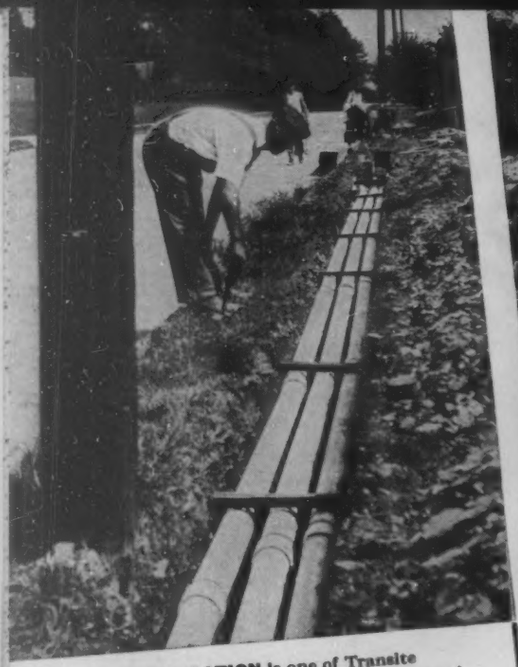
PITTSBURGH REFLECTOR COMPANY
OLIVER BLDG., PITTSBURGH, PA.

Please send me without obligation your folder entitled a "NEW PERMAFLECTOR LUMINAIRE" which gives complete data for sales and installation.

NAME.....

STREET.....

CITY..... STATE.....



ONOMICAL INSTALLATION is one of Transite onduit's outstanding characteristics. Unusually strong nd tough, this permanent material eliminates the pense of "concreting-in" on this three-duct line for reet lighting and residential distribution.

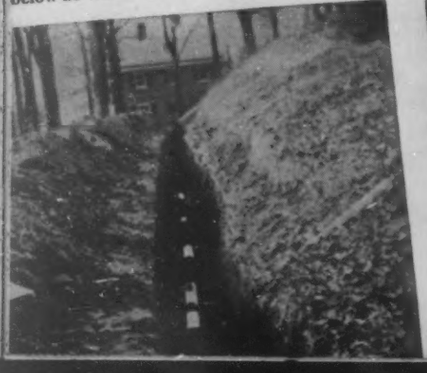
UNUSUAL CORROSION-RESISTANCE assured by its asbestos-cement composition and low installation cost due to the elimination of a concrete envelope make Transite the ideal conduit for residential-distribution systems. (Installation by Haddox Electric Co., Los Angeles.)

RAPID HEAT DISSIPATION is another important advantage of Transite Conduit and Korduct. These cables operate at minimum temperatures. (Above installation of Transite Korduct was made by a large Oklahoma utility.)

LOW INSTALLATION COSTS are yours with Transite Korduct on "concreted-in" jobs. Its smooth bore permits fast cable installation. Here it is being installed on a bridge over the Delaware River.

INCOMBUSTIBLE, Transite Korduct is ideally suited for service where a concrete envelope is essential. Its light weight keeps material costs down. This installation is for the Interborough Rapid Transit Company at Flushing, Long Island.

ERMANENCE at lowest installed cost . . that's the story when Transite Conduit goes down without a concrete envelope on installations like that shown below at Washington, D.C.



ROT- AND DECAY-PROOF, Transite Conduit assures continued efficient service without a concrete casing on this single-duct street-lighting system at Milan, Ohio.

INHERENTLY PERMANENT, Transite Korduct assures lasting efficiency at minimum cost on this "concreted-in," six-duct power line installed by LaClede Power & Light Co., St. Louis.

MINIMUM MAINTENANCE year after year follows the installation of Johns-Manville Transite Conduit on electrical distribution systems of every type. And, on this job at Rockville Center, Long Island, Transite's unusual strength saves the cost of a concrete casing and enables this modern material to withstand successfully all ordinary traffic loads and soil stresses.

TRANSITE KORDUCT, the same material as Transite Conduit except for lesser wall thickness, is designed for service on all multiple-duct transmiss systems, or wherever the service calls for "concreting-in." It offers the sam advantages of Transite Conduit—incombustibility, smooth bore, rapid he dissipation and inherent permanence. Korduct's light weight and long lengths cut handling charges, assure fast installation.

Behind These Scenes...

ONE ANSWER TO THE PROBLEM OF

CUTTING DISTRIBUTION COSTS

NON-METALLIC and durable . . . due to their asbestos-cement composition . . . J-M Transite Conduit and Korduct are incombustible, immune to electrolysis and highly resistant to weather and corrosion. Their smooth, uniform bore permits long cable pulls without injury to cable sheathing. And their long lengths, relatively light weight and ease of assembly assure rapid, economical installation.

In addition, when J-M Transite Conduit is used, you eliminate the entire cost of "concreting-in" . . . for its strength and permanence permit placing it underground *without an envelope!* And it provides substantial savings, too, when used in exposed locations. When installation calls for "concreting-in," Transite Korduct is the ideal material to use. Thinner walled, but otherwise identical to Transite Conduit it reduces material expense yet assures the same last ing efficiency and virtual freedom from mair tenance. If you are interested in th method of cutting your distrib tion costs, why not get full d tails on J-M Transite Condu and Korduct? Ask for Da Sheet Manual DS-4 Johns-Manville, 22 E 40th Street, N.Y. C.

JM PRODUCT

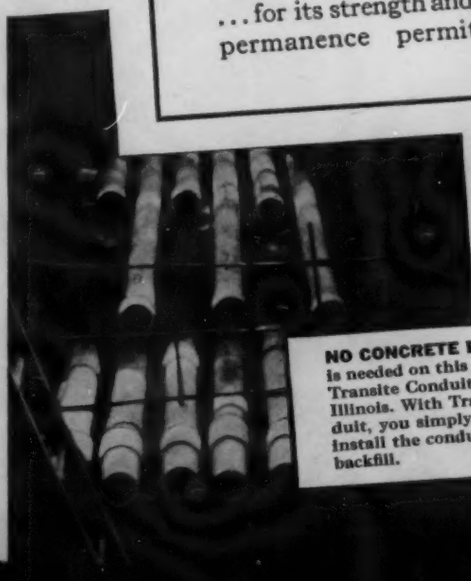
Johns-Manville

TRANSITE CONDUIT

for use underground without concrete envelope and for exposed locations

TRANSITE KORDUCT

for installation in concrete

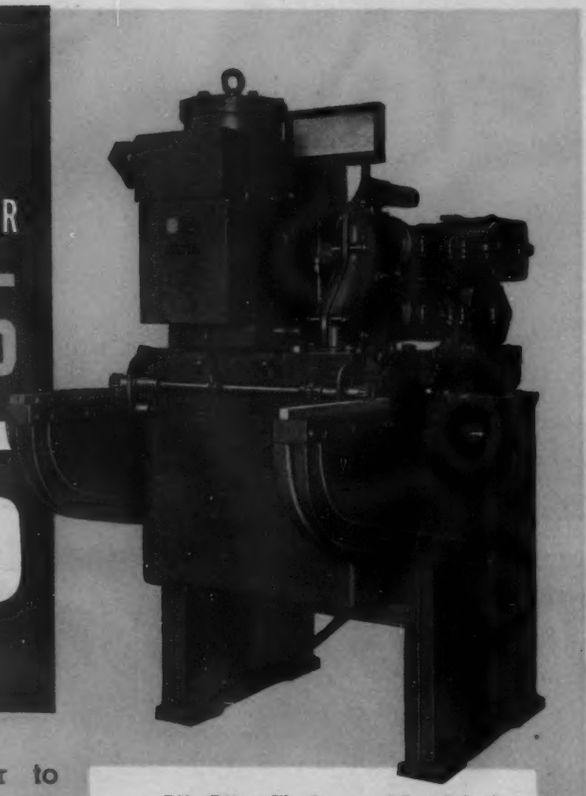


NO CONCRETE ENVELOPE is needed on this 12-duct Transite Conduit line in Illinois. With Transite Conduit, you simply excavate, install the conduit and backfill.

SAVINGS in material expense are provided by Transite Korduct on this Mass. utility job. Thinner walled than Transite Conduit, Korduct has the same durable composition.

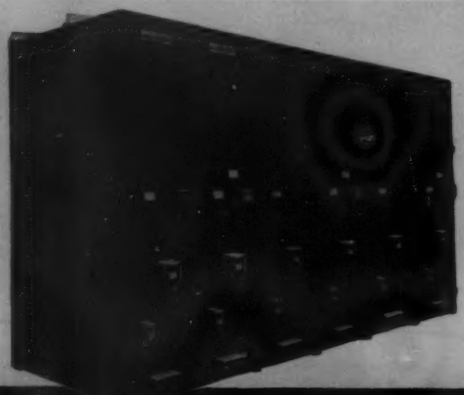
IN THE FIELD OF
METAL ENCLOSED SWITCHGEAR

ALLIS-CHALMERS LEADS



● Whether you need metalclad switchgear to handle the output of a 100,000 kw generator or a simple cubicle for controlling a 400 hp, 2200 volt synchronous motor, get in touch with Allis-Chalmers first. You get the benefit of the longest metal enclosed switchgear experience — backed by hundreds of successful low cost installations in all parts of the country operating under a wide variety of conditions. ● Perhaps Allis-Chalmers has a standard unit that will exactly meet your needs, thus saving money and eliminating the uncertainties of "special" types of manufacturers with less experience. ● From the largest installation to the smallest, Allis-Chalmers has the experience and the equipment to meet your requirements economically and efficiently. Specify Allis-Chalmers and get the most advanced designs and truly modern equipment.

● All Allis-Chalmers Metalclad Switchgear and Cubicle Switchgear are the product of extensive facilities for research, development, and testing which are second to none in the world. In addition they are backed with the longest and broadest metalclad switchgear manufacturing experience in America. Allis-Chalmers are pioneer builders. Specify the original!



842

SWITCHGEAR DIVISION

ALLIS·CHALMERS

MILWAUKEE WISCONSIN

Drop Forged Hi-Line Hardware . . .

If it is standard Hi-Line hardware, you will find it in the BTC catalog. If it is special hardware, you will find the BTC engineers ready to cooperate in every way. In short, you will find that every possible problem in Hi-Line hardware can be met with a forging. Ask your insulator manufacturer.

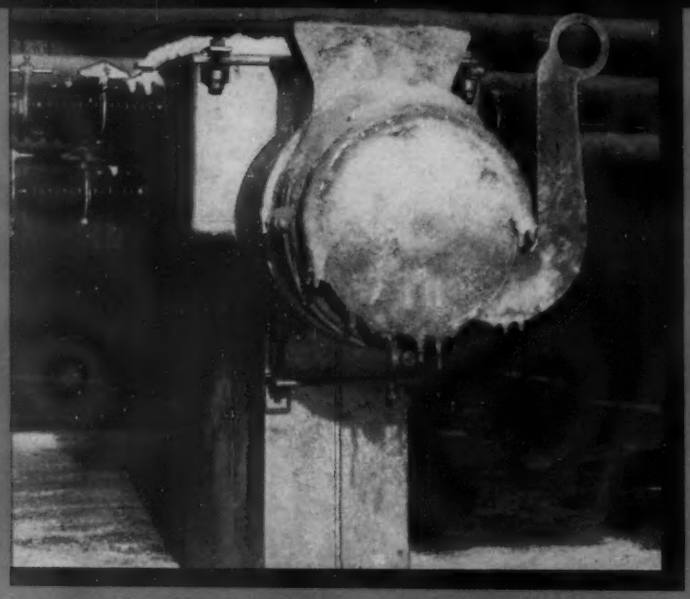
Sold Through Your Insulator Manufacturer only

THE BREWER-TITCHENER CORPORATION
Cortland, New York

These Dependable

POLE-TYPE SWITCHES

Operate Free From Trouble



Frozen: Where tested in quick-freeze ice-houses with buckets of water poured upon them, the Pacific Electric Service Restorers opened and closed with quick precision. Tested at —20 degrees F.

Under ALL weather Conditions . . .

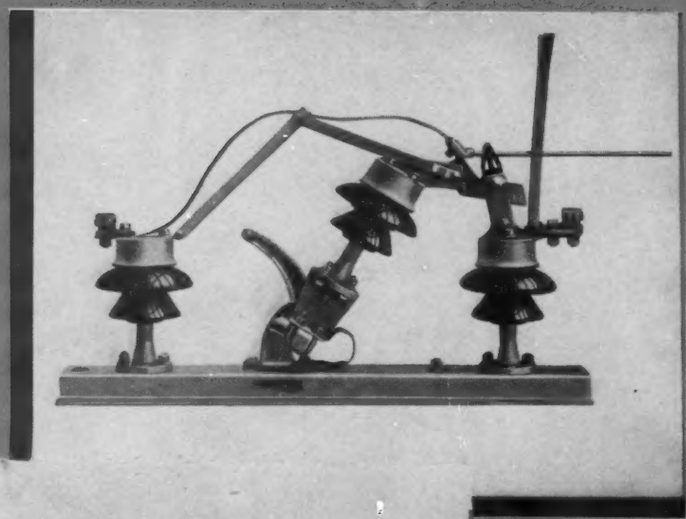
Save Money on Rural or Low-Revenue Distribution Circuits

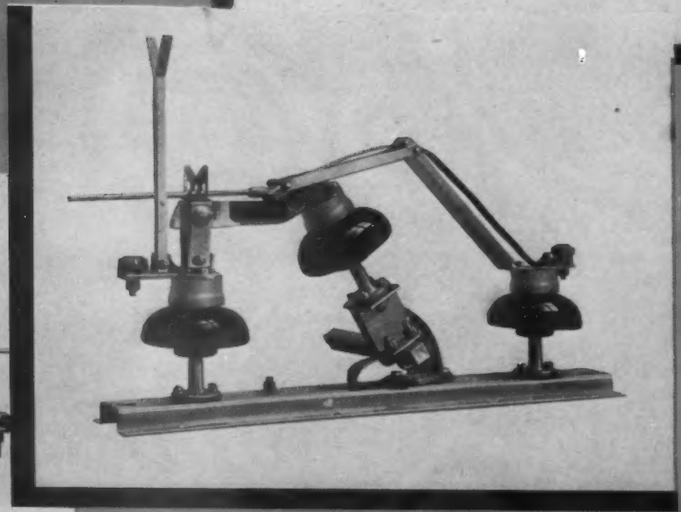
Long life and dependable opening and closing of Pacific Electric switches are assured by their sound design.

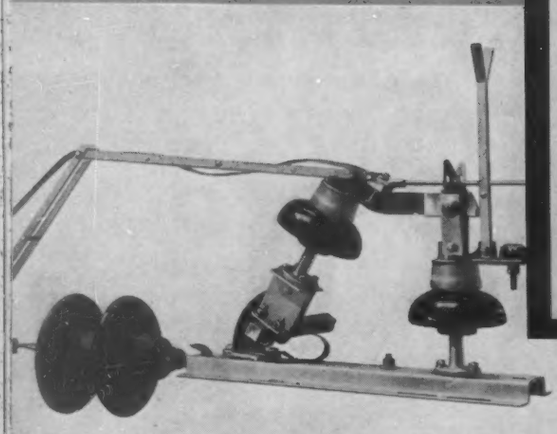
Under actual operating conditions—in freezing mountains and hot deserts—these switches, built to A.I.E.E. and N.E.M.A. standards, have proved reliable for they are built by Pacific Electric engineers, who for 32 years have specialized in building transmission switches with precision and care. Wide flares permit easy entry of blades into contacts and along with smoothly ground surfaces and copper-alloy castings make full load-carrying capacity and easy operation a certainty.

These are a few reasons why Pacific Electric switches, like their big-brother oil circuit breakers, are used by utilities the world over.

When "corners are cut" in switch manufacturing, you may have burnouts, accidents or costly maintenance. So specify Pacific Electric. They save money. They save worry. Their long dependable life and their low-cost-to-use cut operating expenses the year 'round. Ask your Pacific Electric representative for complete details.







Above: Pole-Top Switches, PS-1 (three insulators per pole) and PSA-1 (two insulators per pole) are group-operating, tilting insulator switches; low in cost and available in double-, triple-, or four-pole units for 200 amperes 7,500 to 34,000 volts. N.E.M.A. standard insulators.

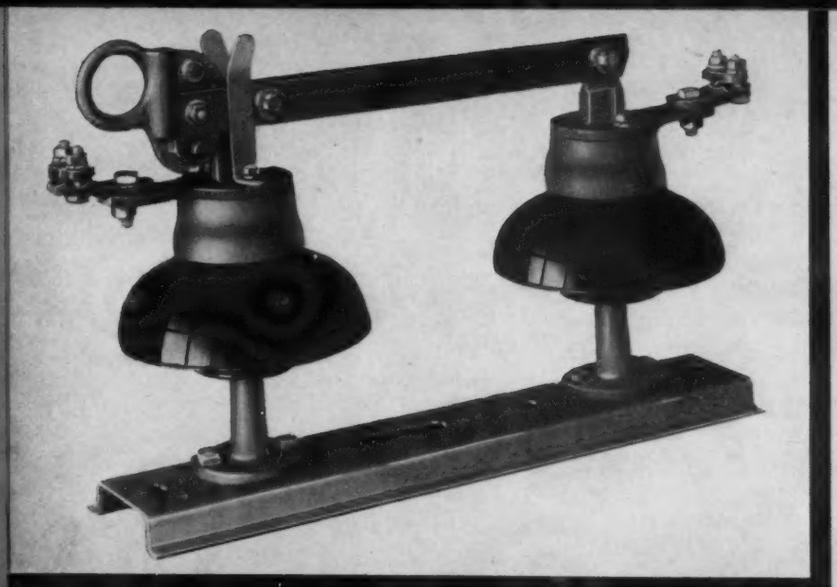
Left and Lower-Left: Light Duty Air Break Switches, Type PS-2 and PSA-2, are also inexpensive switches offered in 7,500 and 15,000 volt sizes and in current ratings of 200 and 400 amperes. Available in two-, three-, or four-pole units. Sub-standard insulators.

Pacific Electric Mfg. Corporation.

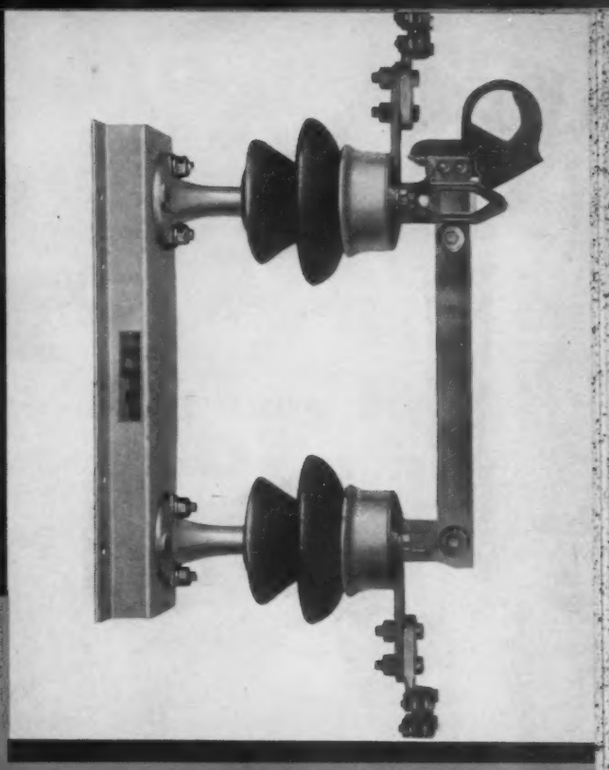
5815 THIRD STREET, SAN FRANCISCO, CALIF.

DUNES HIGHWAY, GARY, INDIANA

Representatives in Principal Cities



ABOVE: Hook Operated Disconnects, Type BF, offered in 7,500 and 15,000 volt ratings and in 200 and 400 amperes. Their rugged construction offers dependable service where economy is desired.



RIGHT: Hook Operated Disconnects, Type BB-1, made in single-pole units as single-throw, double-throw or transfer switches; 7,500-69,000 volts, 200-1200 amperes.

OUTAGES—One Hour or One Second

Pacific Electric Service Restorers Bring Better Public Relations — Cut Maintenance Costs — Assure Greater Safety

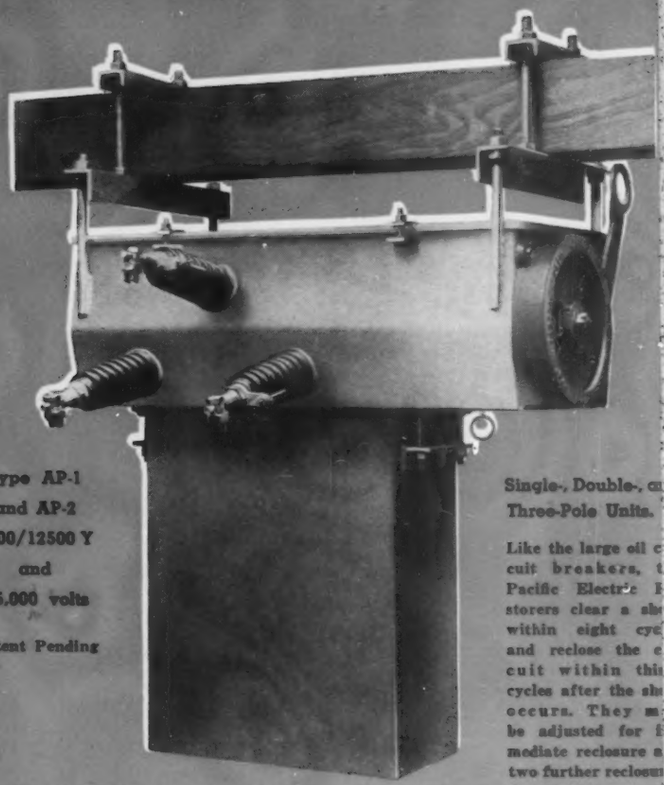
Public relations improve where there are no interruptions in service.

By using Pacific Electric Restorers, you have closer control of pole-type distribution, cut maintenance and assure greater safety to the public and to livestock.

Pacific Restorers reclose circuits immediately and automatically; and unlike fuses, offer maximum safety because they do not emit flashes, which may result in damage to equipment, the starting of fires or injury to linemen. There are no live parts to handle. Pacific Electric Restorers are designed with a wide safety factor.

The simultaneous opening of all poles of three-pole Restorers prevents single-phase operation of three-phase equipment. The use of ordinary single-pole devices cannot prevent single-phase operation on poly-phase circuits.

Pacific Electric Restorers are being used from coast-to-coast for their reliability, economy and low-cost protection. They are precision-built with a high-speed Expulsion Chamber contact and wet-process stud-type interchangeable bushings. The complete unit is housed in a weather-proof, steel cabinet and is easy to install. It can be operated manually. Ask your Pacific Electric Representative for full facts.



Type AP-1
and AP-2
7500/12500 Y
and
15,000 volts

Patent Pending

Single-, Double-, a
Three-Pole Units.

Like the large oil c
cuit breakers, t
Pacific Electric R
storers clear a sh
within eight cyc
and reclose the c
cuit within thi
cycles after the sh
occurs. They m
be adjusted for I
mediate reclosure a
two further reclosu
(one to ten secon
with final locko
after the third rec
ing. A visible dev
indicates the numb
of operations wh
have taken place.

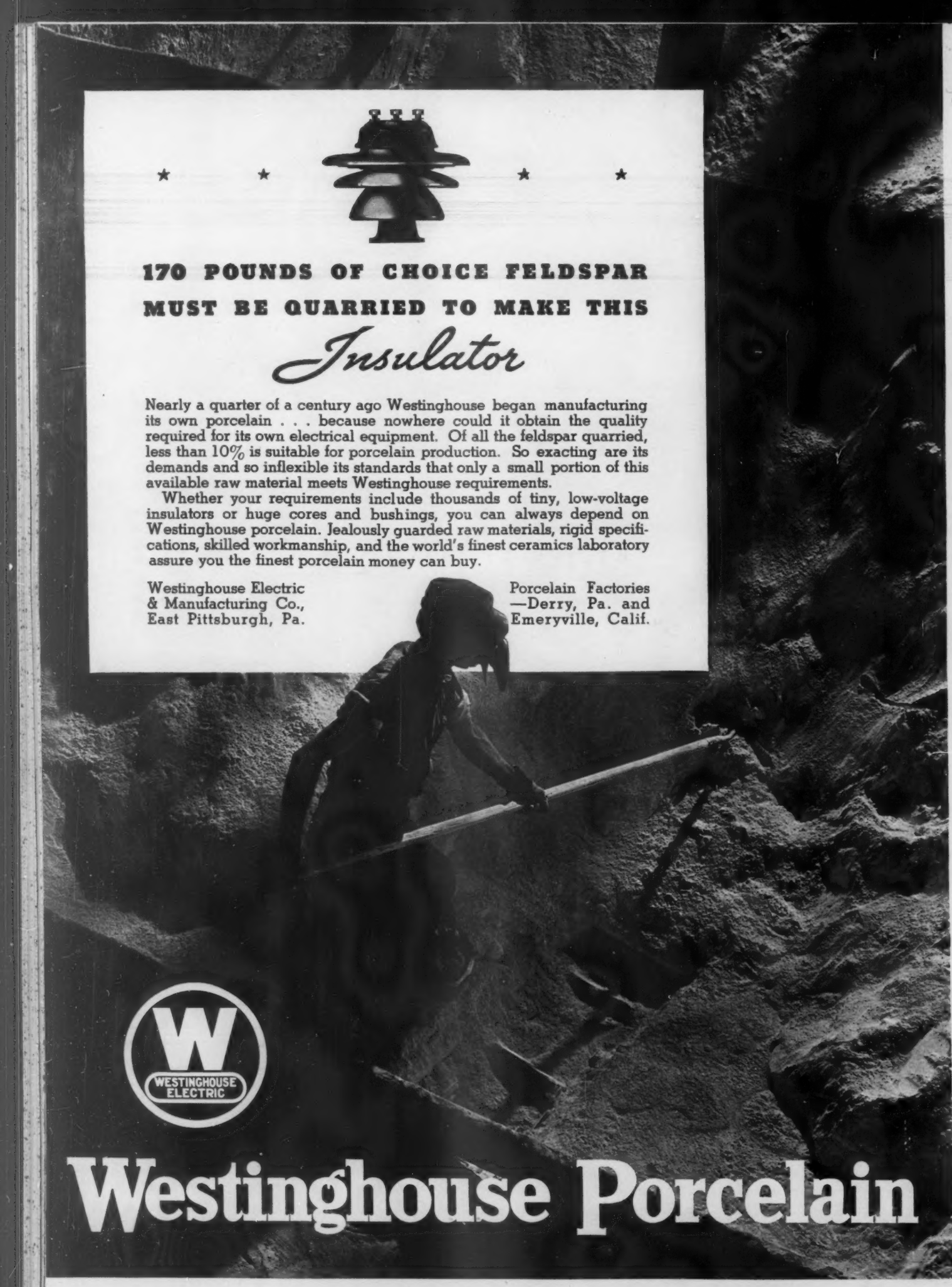
Save Money

Service Restorers don't cost a penny to restore service—no parts to replace. Give better public relations—no outages. Offer added safety—if wire drops less chance of injury to persons, livestock or property.

Pacific Electric Mfg. Corporation

5815 THIRD STREET, SAN FRANCISCO, CALIF.
DUNES HIGHWAY, GARY, INDIANA

Representatives in Principal Cities



★ ★ ★ ★

170 POUNDS OF CHOICE FELDSPAR MUST BE QUARRIED TO MAKE THIS

Insulator

Nearly a quarter of a century ago Westinghouse began manufacturing its own porcelain . . . because nowhere could it obtain the quality required for its own electrical equipment. Of all the feldspar quarried, less than 10% is suitable for porcelain production. So exacting are its demands and so inflexible its standards that only a small portion of this available raw material meets Westinghouse requirements.

Whether your requirements include thousands of tiny, low-voltage insulators or huge cores and bushings, you can always depend on Westinghouse porcelain. Jealously guarded raw materials, rigid specifications, skilled workmanship, and the world's finest ceramics laboratory assure you the finest porcelain money can buy.

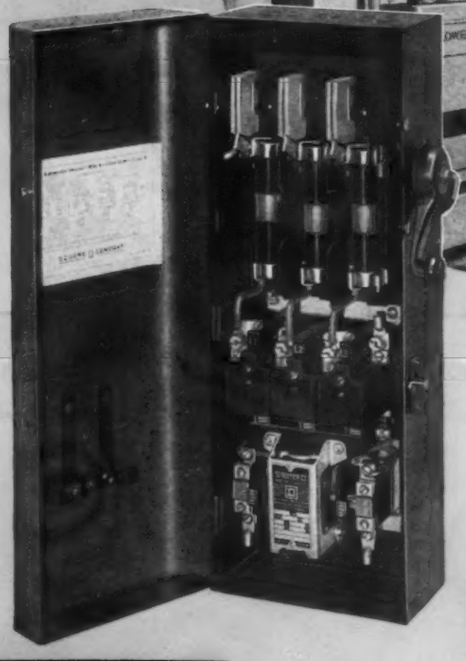
Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Porcelain Factories —Derry, Pa. and Emeryville, Calif.

W
WESTINGHOUSE ELECTRIC

Westinghouse Porcelain

WHETHER MOUNTED ON MACHINES OR GROUPED ON A CONTROL BOARD . . . SQUARE D COMBINATION AUTOMATIC STARTERS SAVE VALUABLE SPACE AND REDUCE INSTALLATION COSTS



The new Class 8538 AC combination starter. Quick make, quick break Square D industrial switch; vertically operating starter with double break silver contacts; overload protection by thermal relays; push button control.

● These photographs were taken in different departments of the same modern industrial plant—a very large manufacturer of bronze and graphite bearings. They show how Square D Combination Starters are most efficiently installed to meet the conditions.

The top picture is a section of the machine shop—clean, airy. The feeders are run through SQUARE-Duct and then down to a combination starter on each machine. The push button station is at the hand of the operator; the disconnect switch within easy reach.

The other picture is in the die casting room. The combination starters and push button stations are grouped on a control board away from the dirt, oil and heat. SQUARE-Duct carries the power lines to the pump and blower motors.

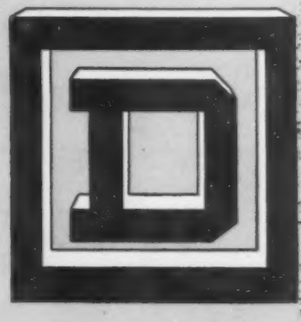
Whatever the plant conditions, Square D can supply the equipment for power and lighting distribution and electric motor control.

SQUARE D COMPANY

LOS ANGELES - MILWAUKEE - DETROIT

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

CALL IN A SQUARE D MAN



O-B ANSWERS FOUR OF YOUR BIG PROBLEMS WITH THESE NEW INSULATORS

PROBLEM 1: Breakage from handling and rock throwing

ANSWER: O-B Huskitypes with Petticoats

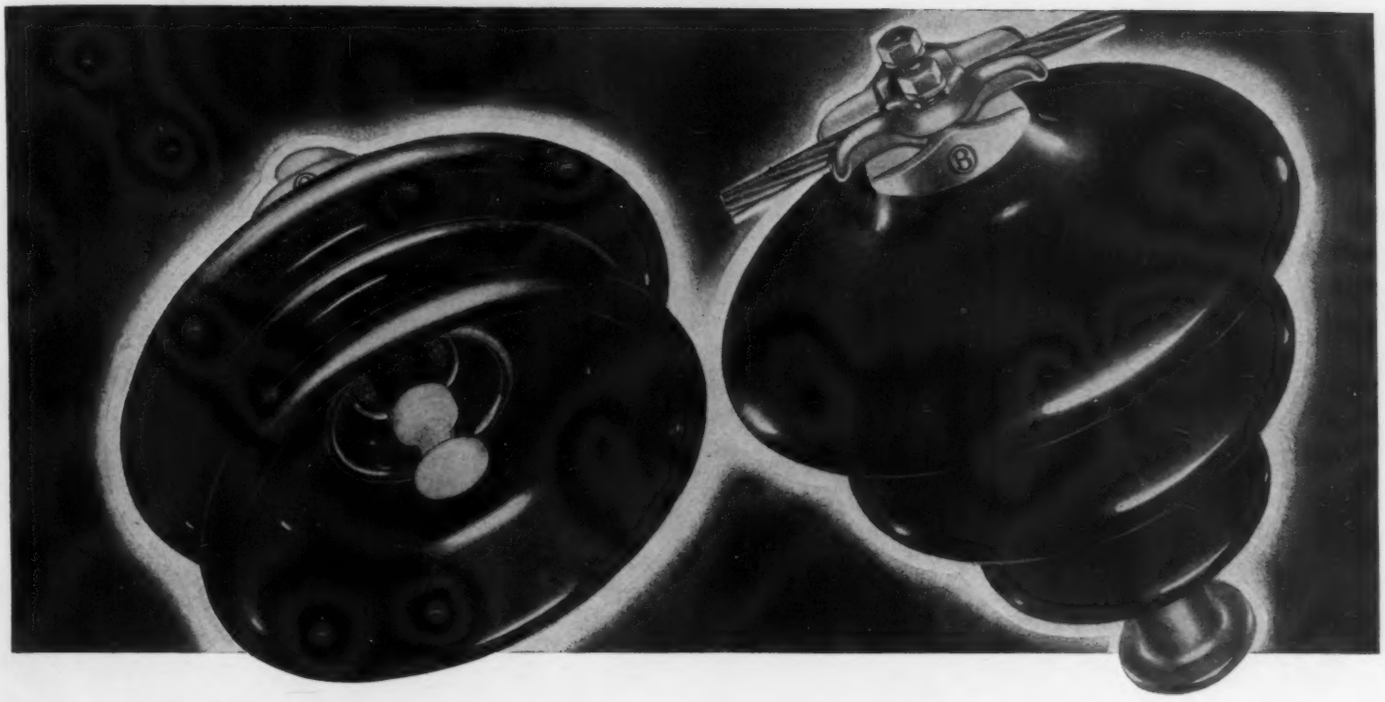
Having high impact resistance, O-B full-petticoated Huskitypes minimize damage from rough handling and missiles. While a special type, they have the same characteristics and long life as standard units. Install them and watch insulator breakage decrease.

PROBLEM 2: Breakage from rifle and other gun fire

ANSWER: O-B Smooth Disc Huskitypes

Gun fire and rock throwing cease to be worries with O-B smooth disc Huskitypes on the line. Bullets ricochet off the under surface without causing damage, and can't hit the surface at a high angle of incidence. Use them to discourage "insulator hunters".

IT COSTS LESS TO USE O-B INSULATORS



PROBLEM 3: Failures from fog and contamination

ANSWER: O-B Smogtypes

Insidious in their workings are those insulator enemies in coastal and industrial areas—fog, smoke, chemicals, dust and other contamination influences. But real opposition to their trouble-making is provided in the O-B Smogtypes.* With extremely high surface resistance, exposed petticoating and an ingenious flux control, these suspensions offer protection against contamination without sacrificing string efficiency. Outstanding, too, is the metallizing of the pin hole for preventing pin corrosion. If you're having fog or contamination troubles, enlist the help of these new O-B Smogtype insulators.
*Smog: A blend of smoke and fog.—*Webster.*

PROBLEM 4: Wire chafing and radio interference

ANSWER: O-B Clamptops

They're the newest in pintype insulators—the O-B Clamptops which use a clamp instead of tie wires to hold the conductor. Modern as tomorrow, these pintypes prevent wear of conductors from vibration and tie wire rubbing, eliminate radio interference, make hot line work safer and easier, and prevent release of conductors. By using a clamp for holding the conductor, the biggest cause of wear—rubbing against tie wires—is eliminated. Since no tie wires are employed and the head is all-metal, the unit is free from radio interference. Do you want to banish all tie wire troubles? You can do so—and economically—by installing O-B Clamptops.

2000-H

OHIO BRASS

MANSFIELD, OHIO

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT., CANADA

50 YEARS OF SERVICE
FOUNDED IN 1888

When Your Feeders Are Loaded Down

Gain System Capacity with Capacitors

TO have the farthermost branches of your distribution system loaded down, almost overnight, is not unusual during this season of the year. Circuit capacities must be increased to handle the new power demand. Ten years ago, overloaded distribution circuits would usually have meant rebuilding old or adding new lines. Today, this is frequently unnecessary. Many power companies are using G-E Pyranol capacitors to increase load-carrying capacities and improve voltage conditions—in many cases at a fraction of the cost of other remedial methods.

In a typical case, two 180-kva capacitors installed on a utility feeder gave the following results:

First, feeder current was decreased 50 amperes per phase, and voltage drop reduced 40 per cent.

Second, feeder capacity was increased by 500 kw, saving $28,000 over the alternative of installing another feeder.

Third, the savings in I^2R losses and in revenue due to correcting the voltage more than paid for the capacitors in the first year.

Why not investigate this low-cost method of adding kw capacity to your system, and save time and money? General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

Filing No. 5700

360-132

ELECTRICAL WEST February, 1938
Vol. 80, No. 2

ELECTRA'S HUSBAND

Women, Ranges and Stream Lines

BEING a non-resident member of the Los Angeles Electric Club, I receive their chatty little publication "Sparks". As it comes to the house, Electra generally reads it before I do. So I was not surprised the other night when she said, "There's an item in Sparks this week that's right down my alley. Listen to this:

" 'How long will it take some range manufacturers to discover that there really are a lot of women who are holding back their order in the hope that they can get a modern stove with a high oven? I hope Philco will be the first and they can advertise, "No squat, no stoop, no squint." '

"That was written by a man but I bet it was inspired by his wife." I put another log on the grate, stalling for time to think up an appropriate comment. "The trouble with folks who talk like that," I said, "is that they're old-fashioned."

"Old-fashioned my eye!" Electra sputtered. "What is older than a low oven! That's the kind the Pilgrims used. There was a reason for it then, because they had to build the oven around the fire. But why do it now? One of the first claims of electric cooking is that it's convenient—you can have the heat any place you want it. Then why revert to the old back-breaking style?"

"You must admit that the new stoves are good looking," I interpolated mildly.

"Humph!", Electra snorted. "So are the new cars good looking, but you know how you crab every time you snag a fender on the curb. There's something wrong if American genius can't design a range with a high oven that would also be good looking. Or a car whose doors can be opened without digging up the grass in the parkway. Listen." I continued to listen.

"Do you remember when the standard height for sinks was thirty inches? They had to be that way because that's what the plumbers and the architects and the carpenters had always done. Those fellows didn't wash dishes. They didn't care if the women had to bend over at their work. And it's the same way now with the goofs that design stoves. Eventually the women made so much fuss that sink levels were brought up where they belong and that's what will happen to ovens when the women who cook speak their piece".

"It's the idea of stream lining," I said, rather weakly.

"Stream line! Why stream line a stove. It isn't going any place at eighty miles an hour. That's just sucker bait, like vitamins. Why doesn't somebody bring out a stream line hay rake? Simply because you can't fool a farmer. And yet the great electrical industry tries to fool women into straining their backs in the name of stream lining."

"Electra," I said, "I'm afraid you're reactionary."

"You bet I am," she retorted. "I believe in the Constitution, the Supreme Court, the Rights of Private Property, the Monroe Doctrine and the High Oven."

THIS little discussion with Electra set me to thinking. Maybe we have lost our imagination. Maybe the electrical industry is not using its head.

It took us about forty years to get away from the chandelier and adopt a method of lighting from coves and troughs which is eminently practical with electricity but was impossible with gas, oil or candles. Just because some ancient cathedral was illuminated by a ponderous fixture with elaborately carved arms, each supporting a candle, we could not escape the conclusion that such a device must be used in the Peerless Hotel, or the College Club or the Municipal Library of the twentieth century. Thank heaven, we have busted those traditions wide open and now we are getting some lighting worthy of the name.

THE other day Electra needed a new element for her range. So she called the power company service department, explaining that she wanted one of the closed elements—giving the trade name. And what do you suppose the service man said? "All right, if you say so. But they're pretty expensive!" This brings to mind another case of a meter reader making his rounds. Coming to a house where a new meter indicated that a range had been installed since his last visit, this fellow remarked, "Lady, you're sure going to get a bill next month." Was it Job who said, "How long, Oh Lord, how long?"

BEFORE long the boys will be talking in earnest about the Golden Gate Exposition and the Palace of Electricity. The industry will be invited to make an exhibit and it should accept. Question: what will be the nature of this exhibit? Electra and I have talked this over and we have decided that the central theme should be "Electricity, the greatest bargain (or value) in America today". Let's take the money that somebody may want to spend for miniature dams and lakes and trees and deserts and powerhouses and transmission lines—and concentrate on a smashing big demonstration of the cheapness of electricity. Here is an opportunity to do what we have talked about for years—namely, to show in dramatic form, an itemized bill for domestic electricity service.

Instead of this:

Feb. 22 981 Jan. 22 881 100 $4.75

which is the sort of thing the customer now gets at the end of the month, we could have a great big, animated display showing just exactly what the householder received for his money. Fix it so the visitor *has* to stay and see it all. Make it so impressive that it will be the thing to remember and tell the folks back home. Spend enough money to get that kind of a result and it will prove a good investment.

That brings us right back where we were when we started. The electrical industry must use its imagination.

Table I—Comparison of Western to National Operations for 1936 and 1937

	11 Western States		United States		Per Cent West to U. S.	
	1936	1937	1936	1937	1936	1937
Energy Generated (Thousands of kw.-hr.)	18,946,041	20,363,092*	113,602,196	118,546,093*	16.7	18.0
Energy Generated in Hydro Plants (Thousands of kw.-hr.)	15,730,150	16,837,345*	40,937,228	43,525,697*	38.4	38.6
Energy Generated in Fuel Plants (Thousands of kw.-hr.)	3,215,891	3,526,625*	72,664,968	75,020,126*	4.4	4.7
Percentage of Hydro to Total Generated	83.5	82.7	37.2	36.9		
Gross Revenue from Energy Sales (Thousands of Dollars)	$243,000	$260,000	$2,044,587	$2,200,000	11.9	11.8
Installed Generator Capacity	5,731,508	5,801,261	36,597,199	36,823,267	15.6	15.8
Installed Hydro Capacity	3,799,339	3,845,673	10,250,000	10,479,264	36.9	36.8

*Twelve months ending November.

Western Growth Tops Nation's

SCOREBOARD for 1937 are the tables herewith. Banner year for the nation, whose generators churned out nearly 119 billion kilowatt-hours, 1937 was even more than that to the Far West. For while the United States upped its output 4.37 per cent over the preceding year, the eleven Western states upped theirs 7.49 (Fig. 3), thus raised the percentage of national output for which they are accountable from 16.7 to 18.0 per cent. These totals for the two years in the West and the nation appear in Table I.

In generating these twenty-odd billion kilowatt-hours, the West chalked up a record that stands for any place, any time — it generated 1,652 kw.-hr. for each person in the region, a per capita output which is 78 per cent greater than that for the nation (Fig. 1).

To the right in Table I are percentages indicating the increasing dominance of the Far West in the electric picture. Only two of the ratios of West to Nation appear lower than those for a year ago. The drop in hydro-capacity ratio (by 1/10 of 1 per cent) reflects the extensive steam additions undertaken during 1937, but columns 1 and 2 show that at the same time far more hydro was added in the West than was steam. Furthermore, the per cent increase in Western capacity was twice that for all U. S., as shown in Fig. 2. Gross revenue showed a 7 per cent increase, and since Western generation increased more than that for the nation as a whole, the lower revenue ratio (also 1/10 of 1 per cent) reflects the West's greater achievement in lowering its already lowest rates.

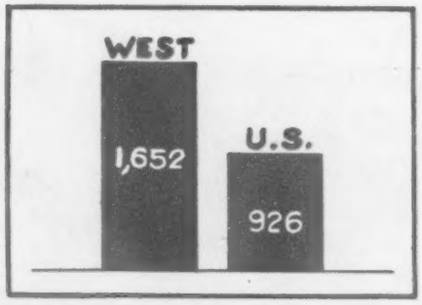


Fig. 1—Kilowatt-hour consumption per capita in the eleven Western states and the United States for 1937 (with 1937 populations at: U. S., 129,337,000 and eleven Western states, 12,550,000).

Table II shows the distribution of this unprecedented energy output

Table III—Type and Capacity of Utility Generators as of December 1937

				Generator Capacity of Plants Operated by										
				One Type of Prime Mover						Combination of Two or More Types				
				Water Power		Steam Power		Internal Comb. Engines		Total		Water Power	Steam Power	Int. Comb. Engines
State	†Companies	*Plants	Total Capacity Kw.	No.	Kw.	No.	Kw.	No.	Kw.	No.	Kw.	Kw.	Kw.	Kw.
Arizona	21	44	226,490	12	129,550	8	62,650	18	8,998	6	25,292	0	7,152	18,140
California	29	153	2,768,621	116	1,703,580	26	1,026,447	9	36,829	2	1,765	850	0	915
Colorado	33	72	251,997	21	63,015	32	179,750	14	6,913	5	2,319	1,344	200	775
Idaho	17	47	249,312	39	244,780	3	750	3	1,612	2	2,170	1,600	0	570
Montana	11	31	277,122	17	265,910	5	6,835	6	1,745	3	2,632	180	1,476	976
Nevada	8	13	341,762	8	338,695	0	0	3	1,635	2	1,432	396	600	436
New Mexico	18	39	94,902	1	80	12	77,652	23	13,727	3	3,443	788	1,430	1,225
Oregon	25	67	371,084	41	189,036	17	175,010	5	1,938	4	5,100	2,030	500	2,570
Utah	22	59	155,947	46	89,324	2	59,750	4	2,116	7	4,757	2,100	0	2,657
Washington	29	68	1,015,212	45	794,379	13	215,722	4	1,122	6	3,989	2,136	970	883
Wyoming	23	39	48,812	7	14,620	17	28,717	11	3,561	4	1,914	1,250	372	292
11 Western States	236	632	5,801,261	353	3,832,969	135	1,833,283	100	80,196	44	54,813	12,674	12,700	29,439
United States	1,649	3,814	36,823,267	1,365	10,251,234	1,211	25,213,131	990	566,883	248	792,019	228,030	458,705	105,284

†Only generating companies and municipalities. Duplications appear for interstate operations.

*All plants generating 10,000 Kw.-hr. or more for public use.

Preliminary F.P.C. Reports.

Table II—Ten-Year Generation Record for Western Public Utilities

(Thousands of Kw.-hr.)

State	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937*
Arizona	335,755	283,023	384,443	404,309	280,898	295,688	344,939	377,797	510,483	651,822
California	7,979,837	8,849,622	8,948,326	8,796,177	7,948,505	8,023,243	8,562,056	9,060,296	10,091,716	9,651,468
Colorado	541,150	563,813	573,341	528,817	478,263	459,453	506,710	549,157	652,404	682,206
Idaho	947,709	894,417	911,709	796,484	584,589	594,428	685,069	672,466	796,430	958,750
Montana	1,619,351	1,613,688	1,319,800	966,097	635,093	922,814	867,504	1,296,199	1,452,390	1,333,063
Nevada	54,935	43,840	42,895	19,006	32,749	24,231	32,152	27,719	171,499	1,063,989
New Mexico	52,326	67,179	75,871	179,658	157,611	157,482	173,233	190,744	214,602	251,829
Oregon	1,040,743	1,161,386	1,219,250	1,176,987	968,980	965,748	1,002,328	1,083,818	1,250,421	1,402,564
Utah	282,791	402,005	292,550	276,483	275,476	327,379	206,679	309,835	418,194	517,933
Washington	2,361,024	2,552,325	2,555,233	2,572,134	2,486,754	2,438,832	2,747,366	2,981,621	3,273,148	3,691,070
Wyoming	83,931	98,665	98,215	94,539	84,633	78,964	81,856	93,779	114,755	129,246

*F.P.C. reports for twelve months ending November.

throughout the Western states and traces its growth through a decade. Two states show slight decreases in 1937: California because of the big blocks of power picked up by Boulder, Montana because of energy picked up outside the state to feed drought-stricken systems. Corresponding to these decreases are excessively large gains for Nevada and Washington respectively.

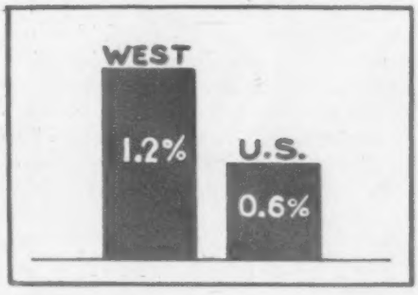


Fig. 2—Comparison of per cent gains in installed generating capacity from 1936 to 1937 for the eleven Western states and the United States.

Just what equipment was responsible for the record output is shown in Table III, which presents a complete tabulation of generating units according to state location and to source of energy, together with totals for both the West and nation.

Table IV classifies customers. Smaller figures shown under "wholesale power and miscellaneous" are due to a number of the latter group being identified and moved to the appropriate class. Elsewhere consistent gains appear, both national and Western total increases being 3 per cent.

Thus, at a glance, is the record for 1937 and the statement of the physical equipment with which the West embarked on 1938.

What sort of story will such figures tell next year?

An even better one. Such is the statement of the central stations themselves as it appears on page 44. These Far Western systems report that this year's expansions and physical improvements will be greater than those of thirty-seven. Such also is the statement on page 57 of the men whose job it will be to see that these enlarged, perfected systems are put to work doing a full-time job for both present and potential customers.

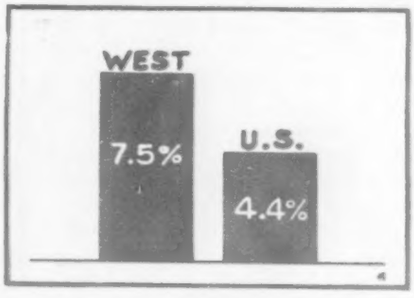


Fig. 3—Comparison of per cent gains in energy generated for 1936 and 1937 for the eleven Western states and the United States.

So it is that just as one achievement is recorded the industry in the West is at work upon another.

Table IV—Customers Grouped by Type of Consumption for 1936 and 1937

State	Agricultural Customers		Domestic Customers		Commercial Lighting and Small Power		Wholesale Power and Miscellaneous		Total Customers	
	1936	1937*	1936	1937*	1936	1937*	1936	1937*	1936	1937*
Arizona	6,409	6,400	56,783	58,100	12,297	12,400	489	600	75,978	77,500
California	103,782	107,000	1,587,651	1,641,600	305,396	306,200	36,681	31,100	2,033,510	2,085,900
Colorado	8,752	9,200	171,580	177,700	28,916	29,100	8,619	9,000	217,867	225,000
Idaho	17,958	19,400	63,490	65,900	13,231	14,100	970	600	95,649	100,000
Montana	33,612	3,800	79,395	82,800	16,658	17,100	686	800	100,351	104,500
Nevada	1,271	1,300	17,845	19,400	4,311	4,500	398	200	23,825	25,400
New Mexico	2,000	2,100	32,038	33,400	8,755	8,800	680	800	43,473	45,100
Oregon	25,917	28,000	193,797	199,800	37,430	37,100	3,516	4,100	260,660	269,000
Utah	17,854	19,200	87,479	88,900	12,803	12,500	2,060	2,300	120,296	122,900
Washington	42,289	47,000	352,062	359,600	55,822	56,400	5,506	5,200	455,679	468,200
Wyoming	1,548	1,600	29,009	29,800	6,172	6,200	1,103	1,200	37,832	38,800
11 Western States	231,392	245,000	2,671,129	2,757,000	502,891	504,400	60,708	55,900	3,465,120	3,562,300
United States	1,042,924	1,200,000	20,967,440	21,600,000	3,825,289	3,865,000	350,226	335,000	26,205,879	27,000,000

*Estimate based on first ten months

1938 Setting the Goal for the Year Ahead

Engineering

By D. D. SMALLEY
General Superintendent, San Joaquin Light & Power Corp., and Chairman, Engineering and Operating Section, P. C. E. A.

TO a greater degree than ever before utility engineering and operating departments must exercise foresight and initiative in dealing with present confusing conditions. The unusual increase in connected load and system demand in the face of the present business recession calls for careful study and analysis of all factors involved in furnishing reliable and reasonably priced electric service.

D. D. SMALLEY

The wise engineer will give consideration to discarding what have in the past been commonly accepted methods, take full advantage of new ideas in design and use recently developed materials and equipment to effect economies in construction and operation.

Construction engineers are called upon to serve loads which appear to be somewhat speculative in character, particularly in view of nation-wide market conditions. In these cases they should consider the salvage value and mobility of equipment installed so that they may meet changing conditions of load at the lowest possible cost. Many times it is possible to avoid the construction of distribution lines by the installation of equipment which can readily be salvaged and moved if the project originally served is not successful.

The trend toward low cost rural lines has had a tendency to encourage cheap construction which may seriously affect maintenance and operating costs later. Considerable judgment must be used in this sort of work because what appears to be low cost construction may actually result in high annual charges. Too great reduction in clearances and safety factors is undesirable from a hazard standpoint and may interfere with service continuity. The operating engineer recognizes that safety and service is a definite obligation and this thought must be emphasized in the minds of those responsible for construction so that safety and service will not suffer from the construction man's efforts to lower his costs. Economy has always been the watchword of the operating engineer, but he is now asking himself and the power sales department how far he shall go, how far he must anticipate in order to serve new system load economically. Certainly there is no economy in building only for today; therefore he must anticipate so as to avoid heavy expense in duplication of work for future load.

The engineer must establish some base line of minimum maintenance and try so far as is possible to stay on that level. Sliding below that minimum destroys the economic balance. But he must take advantage of opportunities offered by exceptionally good conditions to maintain above the minimum.

One answer to these problems may be found in organization of various sub-departments, responsible for engineering and operating work and all coordinated to develop economic methods and practices, which will cooperate with sales departments to give counsel in selective selling.

Applications may be received for service to apparently attractive loads, but when the cost to serve is analyzed the results indicate that no effort should be made to secure the business. The engineering department should be consulted whenever any major blocks of load are to be added so that the cost to serve will be a factor in determining whether or not such applications will be approved.

Both the construction and the operating engineer have definite responsibilities in connection with all of these things. Always avoiding any tendency toward a too-radical departure from fundamental laws, they must have courage to depart from out-moded ideas and present new methods for consideration. Authority must be delegated to organization in proportion to the responsibility imposed, for in that way alone can initiative and the development of ideas be properly encouraged.

●

Management

By FRANKLIN T. GRIFFITH
President, Portland General Electric Co.

AS TO general business conditions I am inclined to be optimistic. I do not believe the present recession will be of long duration and I expect good results from what I believe to be the genuine efforts to adjust the differences between government and general business. It is reasonable to expect that be-

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F. T. GRIFFITH

fore mid-year fear will give place to returning confidence and that the improvement in the latter half of the year will cause the figures for the whole year to compare favorably with the results for 1937. Naturally all this will affect the electrical industry.

It is true that in some sections kilowatt-hour sales in the last several months have shown a substantial and continuing decrease. This decrease in many instances may be attributed almost entirely to curtailment of operations in some one group of manufacturing plants where labor disputes have caused shutdowns. There has been only a slight reduction in consumption by the great majority of industrial plants and many of these offer real opportunities for increasing and improving their electrical applications to offset rising production costs. Commercial load is holding its own and domestic load continues slowly to increase in response to the united promotional efforts which we know are so essential.

Utilities have for many years been making their service more attractive from the standpoint of usefulness and economy and have engaged diligently in developing markets. They must continue to prosecute this course in an effort to give the widest and freest use of energy at the lowest practicable cost. This, after all, is the best and most easily understood answer to the arguments of those who would substitute public for private ownership.

It should be possible eventually for the general public to profit from full cooperation between the privately-owned distributing utilities and the governmentally-owned projects producing power, thereby protecting the integrity of private utility investment and preserving for the people tax contributions now made by the utilities which could not well be spared in this era of rising governmental costs.

The utilities have many problems of long standing, most of which are closer to solution than ever before. This holds particularly for our technical and physical problems. It is in the field of human relationships where our major efforts must be directed.

●

Wholesaling

By C. D. RUSSELL
President, Associated Wholesale Electric Co.

LIKE the truth, the wholesaler's job has many facets. But the sudden and unexpected drop in the wholesaler's volume suggests the urgent need of turning his hand more especially to crystal gazing.

What effect will the future trend of business have upon present or new lines, especially household appliances? Will the trend as affecting prices be inflationary or otherwise, and when will such changes, if any, occur? Can the slack in volume, if continued, be taken up by placing an additional load on personnel by diversification or more intensive activity on present lines? And to what extent, if any, should overhead

C. D. RUSSELL

expenses be adjusted to present volume?

Not only is it important that the wholesaler form a clear picture of future business trends, making due allowance for the possibility of violent fluctuations, but it is equally important that he weigh and judge accurately the relation of his present actions upon his future ability to cope with changed conditions. For example, in deciding whether or not to make immediate reduction in personnel he must face the fact that if the level of volume and profit continue as at present or go still lower during 1938, failure to make a small reduction now may be the direct cause of forcing a much more drastic cut later; on the other hand, aside from the vital human aspect, the fact can not be lost sight of that every employee represents an investment which can be cashed in on in a substantial way if or when volume increases to, or beyond, the 1937 level.

The same general attitude of taking the future into account more than either the present or the past applies to present and prospective lines of merchandise, particularly of the specialty sort, any one of which may not now be profitable but which may easily have substantial volume and profit possibilities later in the year if or when the general condition of business materially improves.

What of the current challenge to business for cooperation with the government in checking the recession by increased rather than decreased spending? And the pressure for a return to free and unrestrained competition as a means of lowering prices? Group demands within the industry are equally, if not more, insistent and are subject to the same logic.

Since it cannot be denied that the business of the wholesaler, no less than any other large or small business, is invested with a public interest and has a responsibility toward the government and industry groups alike, it is a vital part of the wholesaler's job to meet squarely the issues raised by this challenge and these demands. Here again the need is for vision, for if it be a question of giving separate consideration to the group welfare, bearing in mind the full implications of the word "separate", the answer would be negative.

Only a Socialist or one who has no faith in the economic system under which the people of this country have enjoyed the largest measure of freedom and well-being in history would fail to subscribe to the essential formula that every man, and in particular every individual business concern, serves the best interests of the group whether it be society or a small group insofar and only so far as he truly serves his own best interests; and, by the same token, in really and truly promoting his own best interests he thereby automatically serves best the interests of all those toward whom he may be said to bear a relationship of responsibility.

So while the government, no less than other groups, is entitled to look to the wholesaler to carry his share of the burden, co-existent with inter-dependence, neither it nor they can fairly go further than to expect that he be governed by an intelligent self-interest that looks beyond the immediate effect to the ultimate flow of consequences. Honest differences of opinion will of course arise as to precisely where to draw the line between the immediate effect on the one hand and the long-swing and hence less obvious result on the other; but his fellows who are honest as well as informed will grant that the final decision must necessarily rest with the wholesaler himself. Not only must he alone bear the full responsibility for his actions but, perhaps more to the point, he also will, in the long run, inescapably suffer or enjoy the consequences according to the degree of intelligence that he has exercised in the determination of his self-interest.

There is of course nothing new or unusual about the exercise of foresight in any business, but it does seem that the wholesaler's job for 1938 demands the exercise of a higher order of imagination and foresight than heretofore.

The wholesaler's job for 1938 calls for vision!

Commercial

By R. E. FISHER
Vice-President in Charge of Public Relations and Sales, Pacific Gas and Electric Co.

IN answering the question, "How are we to secure more load in 1938 than was secured in 1937?", the utility commercial men must give consideration to several significant factors. Although public acceptance of electrical appliances is at a new high, keener competi-

R. E. FISHER

tion for the homemaker's dollar precludes any letdown in our promotion to increase domestic electrification. The current recession, which economists say is only temporary, gives us the added responsibility of working to retain load as well as to build new business. And the pressure of increased taxes and operating expenses on the one hand and the public demand for lower rates on the other calls for a job of selective selling in which the profit possibilities of every piece of new load added to the lines must be assured.

Several new and old fields promise to produce new business in direct proportion to the degree with which they are cultivated intelligently.

Industry faces the problem of producing more efficiently to offset rising labor costs and taxes. The industrial field thus offers larger opportunity than ever before for electrical applications and development. Coupled with this is the trend of industrial movement Westward to take advantage of growing market possibilities and undeveloped natural resources. To stimulate and encourage this movement calls for a high degree of engineering salesmanship. The time has arrived for a more liberal attitude in the matter of competition. In this connection the projected construction of two steam plants adjacent to industrials with large steam requirements in their manufacturing processes by Pacific Gas and Electric Co. may indicate a major new trend.

With the promise of a federally-promoted home building program to stimulate construction and offset the housing shortage, plans should be laid for intensive local promotion of adequate wiring. A national adequate wiring program which is sponsored by every branch of the industry is being developed. The degree to which it will be effective will depend upon the local application of its details. The problem of increasing the capacity of the electrical highways into the home will not be solved without going to the building public with a well-organized sales story.

Too much emphasis cannot be placed upon the importance of the lighting field as a source of new business. This so-called base load of the electrical business can still be productive. There are so many new developments in lighting, and the public is becoming so thoroughly educated to the importance of lighting, that active sales effort is certain to produce new revenues. One factor which should arouse new interest in commercial lighting will be the forthcoming Golden Gate International Exposition with its spectacular lighting effects.

To an ever increasing degree the success of our sales programs is dependent upon trained and competent manpower. Sales activity is a recognized, essential and continuing function of utilities. Management appreciates it as such. It should be attractive to and remunerative for the highest type of salesmen.

Whatever may be the complexion of the economic picture at the end of 1938, it will be a fact that the sales departments will have given a good account of themselves.

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Maintenance

By WALTER E. COBURN
President, Electrical Maintenance Engineers Assn. of Southern California

WILL plant management give serious consideration to a sensible training program for up-grading the craftsman on the job? They will and must. In fact, it is being done right now in California. But it needs to be carried into the electrical industry.

Let us review the situation as regards journeyman electricians. Until 1929 there was a system of training electrical workers and craftsmen in most all trades. When the slump of 1929 occurred the craftsmen were laid off. There were no jobs to be had where they could work at their trades. They found employment elsewhere at other jobs.

Since there were no jobs, there was nowhere for young fellows to work so that they could learn the electrical trade. By the time the wheels of industry began to turn again at near 1929 levels of volume, it was discovered that we had a shortage of skilled craftsmen.

That shortage still exists. In the diversified value of the average journeyman today we find much room for improvement—a broadening of his capabilities is imperative. We find many operators, but few real qualified electrical craftsmen; these are rapidly disappearing. Their average age is forty years.

The U. S. Census for 1910, 1920 and 1930 shows 120,155; 212,964; and 280,279 electricians listed; also in 1910, 1920 and 1930 it lists 2,661; 9,562 and 4,611 apprentices. The ages of these electricians in 1930 are listed as fol-

W. E. COBURN

lows: 18-24 years, 55,000; 25-34 years, 107,500; 35-44 years, 76,000; 45-54 years, 34,500; 55-64 years, 11,000 and 65 and over, 2,300.

Now since but few learners have entered the electrical industry subsequent to 1929, it follows that the average age has continuously risen, and many electricians should probably be retired that are still working. A further examination indicates that many have not had the advantage of an organized course of training.

We have all had the experience many times in the past few years of newly employed electricians coming on our jobs, poorly equipped to do an electrician's work. This, of course, causes additional expense in plant operation. The only remedy is to upgrade these men on the job by providing a well organized course of training for them.

Many plants and industrial organizations throughout the country are now doing just that. In California the Union Oil Co. is setting up fine training programs and by modern, scientific testing, uncovering the trade and technical

abilities of their craftsmen. When weakness is discovered in a craftsman, he is given the opportunity of going to school four hours per week on company time and four hours per week in the evening on his own time. When he has learned the skill and experienced the technical knowledge qualifying him for the next higher rating, he is promoted as vacancies occur in the higher rating.

The instructors are men who are well qualified, both by experience and technical knowledge in the various crafts, to teach the several skilled trades required in the oil industry. The testing is being done by a committee of three, the foreman under whom the craftsman works, and two qualified craftsmen in the same craft as the man being examined.

The methods of yesterday and of 1937 are out-moded—obsolete. We must meet tomorrow's demands for increased efficiency in manpower, greater technical skill and ability in fact and not in misrepresentation of promises of doubtful accomplishment. We will meet this challenge with modern methods and techniques.

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Contracting

By S. G. HEPLER
President, Arrow Electric Co., Seattle;
Executive Committeman Dist. 10, N.E.C.A.

BEFORE the electrical industry can anticipate the new business it will secure through any stimulation of the building and construction fields, it must face a set of obvious but unanalyzed facts. The business and profit which the contractor, wholesaler and manu-

S. G. HEPLER

facturer hopes to secure from stimulated building will depend upon how well we tell our story to the public.

High government officials, newspapers, loan organizations and others are all stressing so-called high building costs until the bewildered prospect, hopeful of some future reduction, sits back and waits. He believes these statements are true. As a matter of fact, no yardstick by which costs can be compared has been presented to the buying public. The principal reason is that no thought has been given to the underlying facts.

It is true that construction costs have increased, but the rise has only paralleled the price of labor, which in the building field usually represents approximately 90 per cent of the job. The real reason for the increase is due to the desire of the purchasing public for more and better things. The apparent mental yardstick of the present-day purchaser of a new home unfortunately seems to be that of 1919 or earlier. The building industry, with minor exceptions, has failed to engender in the mind of the public all the modernized features which comprise the home of today, together with a conception of what these mean in terms of cost. The public wants all the modern features; yet it fails to attach a monetary value (or at least cost) to them.

The public bases its opinion of costs on the supposition that a three, four or five thousand dollar investment should procure a home of a certain type, embodying all the last decade's revolutionary developments in better living. It overlooks the fact that the home of 1919 or even 1926 did not have two bathrooms equipped with high class modern fixtures; that it did not have a two-car garage; that it had hardwood floors in only one or two rooms; that it did not have automatic heating or air conditioning; that the wiring was sufficiently adequate only for lighting, and that no provision was made for electric ranges, bathroom heaters, radio and all the multiple electrical conveniences of recent years.

Nevertheless, today when the homebuilder thinks of a home, he visualizes all these advantages and more. It is to be his "dream" home—modern, complete, full of comfort and convenience-giving features. What a shock when he receives a quotation on just such a home! He has built it on an outmoded yardstick of imagined costs. His dream is shattered and his wail is heard to the high heavens—in the particular instance of 1938, by the political powers, who are at once moved to provide a remedy.

The fault lies with the construction industry and its branches in that it has failed to present the facts regarding costs in a manner that the public can understand or interpret. Unfortunately the electrical industry is caught on the horns of this dilemma.

The public wants livable, labor-saving homes. The electrical industry can provide these advantages. The task is one of selling the value appeal as against the cost of an electric kitchen, a modern laundry, adequate lighting and all the other services our industry can put into a home. We can't sell just a wiring job, but we can sell comfort and convenience and safety. Our industry needs the market which new homes will provide for energy, appliances, equipment and wiring.

Let's overcome the fear of costs with a selling story based upon the values we have to offer. Until we do, the public will never be convinced that its 1919 yardstick isn't right.

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Manufacturing

By JOS. S. THOMPSON
President, Pacific Electric Mfg. Corp.

IT MAY be that incorrigible optimism is the only basis for the writer's belief that this present low barometer business period is of a very transient nature. While there can be no doubt that stock market activities and business volume greatly influence each other, they are not inseparable and the stock market can respond to every ru-

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J. S. THOMPSON

mor or fear where business responds only to demand. In the long depression, business and the stock market suffered for the tremendous reaction of the World War but those things that have brought about the present stock market down-curve are not the destruction of values and loss of equities that made business volume accompany the market in the early thirties. With this viewpoint clear, the electrical manufacturers can lay plans for an extremely active year and confidently expect it.

If the representative business man could learn that his interest does not lie with the land speculator and that vigorous and continuous business growth and volume would ensue if we could lift the burden of taxation from busi-

ness and the home, replacing it with the public collection of the publicly created land rental value, he would start along a pathway of genuine business recovery that would make him feel as Sinbad the sailor might feel were the Old Man of the Sea to descend from his shoulders.

If our governmental administration would cease to harass the vital and essential power industry and devote its attention to land speculation, the health of the country and the security of the business man would be a source of immeasurable gratification.

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Retailing

By HERB NAMES
Charles E. Wells Music Co., Denver,
Chairman, Dealers Division,
Rocky Mountain Electrical League

THERE'LL be no advance along the electrical merchandise front in 1938 if we fall into the error of guerilla warfare and sniping. The forces of recession are too strongly entrenched to be routed by such puny tactics. A vigorous, highly-organized offensive, with all electrical interests in close formation, is the sole solution of the year's sales problem.

In this region, with the members of the Rocky Mountain Electrical League as the "shock troops", we captured the Christmas sales salient with a bold coup —diverted into appliance channels thousands of dollars budgeted originally for other purposes. With a sustained series of expositions, special editions of newspapers, merchandise reviews, radio programs and the plastering of everything but the scenery with colorful Christmas posters, customers were directed into every appliance store in the territory.

The same methods must be employed throughout 1938. And an unrelenting program of this nature will not only redound to the benefit of the electrical industry; it also will be a factor in stimulating other lines of business and maintaining wavering confidence.

Fortunately, the major electrical organizations of the nation, companies and associations, sense the need for such direct action. Their programs are now in the making or ready to launch. They will constitute the big guns that will support the action on scattered fronts.

It is only by tying in with our powerful supporting forces that we will attain our objectives. Those who elect to invade the sales field alone, who disdain the protection and help of the massed troops and resort to sniping will soon find themselves in distress.

There are several cogent reasons why the electrical interests of the Rocky Mountain area are not singing the blues. There is closer cooperation among the dealers, distributors and utilities. There has been a decided upturn in the standards of merchandising practices. Ethics have been stepped up. Destructive competition has diminished.

Back of all this has been the constructive activity of the Electrical League, outgrowth of a merger of all precedent organizations. With thirteen local units, consisting of dealers, contractors, jobbers, utilities, manufacturers and distributors, it constitutes a ready-made and powerful vehicle for traversing the rough road that stretches ahead.

HERB NAMES

The tendency in some quarters to reduce sales forces, on the theory that there will be no sales for them to make, is going to reduce competition for those organizations which push confidently ahead with undiminished vigor. The relinquishment, in part or in full, of direct merchandising on the part of numerous utilities in this region will create further opportunity for aggressive dealers. The Electrical League throughout 1938 will prosecute a program calculated to maintain sales volume and otherwise promote the interests of all appliance outlets in those localities where the utility has retired from the merchandise business.

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Inspection

By GEO. E. KIMBALL
Electrical Engineer, California Industrial
Accident Commission

AN ELECTRICAL inspector's job is not an easy one if he conscientiously discharges his duties. It is his responsibility to see that electrical wiring and equipment are safely installed, operated and maintained. He is concerned not only with the electrical contractor and his work, but he also has to consider the interests of the owner and the community. On his word may depend the security of property worth many thousands of dollars and the safety of human life which is more precious than gold.

It is important, therefore, that the electrical inspector should be well equipped to meet the many problems encountered in the discharge of his duties. He should have had years of experience in electrical work and should also have thorough knowledge of the regulations he is required to enforce. We will assume that he has the years of experience. A knowledge of the regulations may be acquired.

The recently revised National Electrical Code, in its new form and arrangement, is more easily comprehensible than previous editions and lends itself more readily for study and analysis. A good inspector should not merely memorize a rule, but should thoroughly understand the rule and the reason for its existence. This understanding may be greatly facilitated by studying an analysis of the 1937 revision of the National Electric Code and the official interpretations.

All of these are made available to him through membership in the International Association of Electrical Inspectors. The objects of this Association are: "To cooperate in the formulation of standards for the safe installation and use of electrical material, devices and appliances. To promote the uniform understanding and application of the National Electrical Code and other electrical codes. To secure and promote uniform administrative ordinances and inspection methods. To collect and disseminate information relative to the safe use of electricity. To represent the electrical inspectors in all matters which are dealt with nationally and internationally by the electrical industry. To cooperate with other national and international organizations in furthering the development of the electrical industry. To promote closer cooperation between inspectors, inspection departments, the electrical industry and the public."

At the annual meetings of the various geographical sections of this association and in the local chapter meetings, the electrical inspector meets inspectors and other men in the industry, and discusses with them the things which are of mutual interest. This exchange is valuable to both. When combined with the information received from papers and other material presented at meetings and with the reports of similar meetings held in other sections and chapters, a fund of information is made available to the inspector which should go far toward the solu-

tion of any questions which may arise.

All of this is particularly valuable to the electrical inspectors in the small cities and towns. In a way he is isolated from the metropolitan areas where the major electrical projects and installations are completed. Without his contact with his brethren, engaged in the same kind of work, through the meetings and agencies listed above, he would not be in a favorable position to

G. E. KIMBALL

ward off the attacks which may be made on his office by those who may have no interest in safety or in the reliability of service.

The 1938 electrical inspector is in a more favorable position than ever before to provide the service which the duties and the dignity of his office imply. His opportunities are limited only by his desire for knowledge and his ambition for work.

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Advertising

By R. G. KENYON
Advertising Manager, Southern California Edison Co., Ltd.

ANY advertising program which goes out in the name of an electric utility has two distinct functions to perform. First, it must sell the merchandise —ranges, refrigerators, water heaters and other load building appliances. Second, it must sell the company itself, preferably by telling the story of the company's community of interest with its consumers. In carrying out these two major objectives, every possible advertising approach to the consumer's mind should be weighed and considered. Any utility advertising should be tailor-made to fit the specific class of customer to whom the campaign is addressed. It goes without saying that the advertising program of the utility must be entirely truthful and sincere.

In southern California there are three distinct classes into which advertising appeals may fall: 1. domestic; 2. industrial, agricultural and commercial; 3. institutional.

In the preparation of copy intended primarily to sell electric labor-saving devices for the home, it is important that the appeal be made to the entire family. While we recognize the fact that the women of our country are the real purchasing agents in most phases of home economics, our experience in the selling of electrical appliances teaches us that between 60 per cent and 75 per cent of all sales of this type of equipment are made when husband and wife are together. No member of the family may be left out when an advertising appeal aimed to sell the further use of electrical convenience in the home is being prepared.

Basically this type of advertising calls for a straight merchandising technic. In the approach to the domestic consumers—men, women and children —the use of practically any mass advertising vehicle is indicated.

In the effort to sell electricity for the second classification, industrial, agricultural or commercial, the use of trade magazines and direct mail will be found to be most effective.

In attempting to make a direct institutional appeal to the consumer of the electric utility, there probably is no more effective medium than the newspaper, although other mass appeal media may properly and profitably be used.

R. G. KENYON

Institutional advertising should maintain a sane and temperate viewpoint. It should be neither controversial nor defensive in tone. It should be aimed so to interpret the problems and ideals of the company as to make defensive advertising unnecessary and controversial copy superfluous.

Any utility advertising program must maintain a year around continuity. Of course, there will be need for an occasional major campaign, but while these will not be in progress all the time, there must be a continuous use of advertising vehicles to keep the name of the company and its product definitely in the mind of the customer group.

Utility advertising should be timely, should be newsy (from the consumer's point of view) and should present the company in its true light as a community institution whose interests are identical with those of its consumers.

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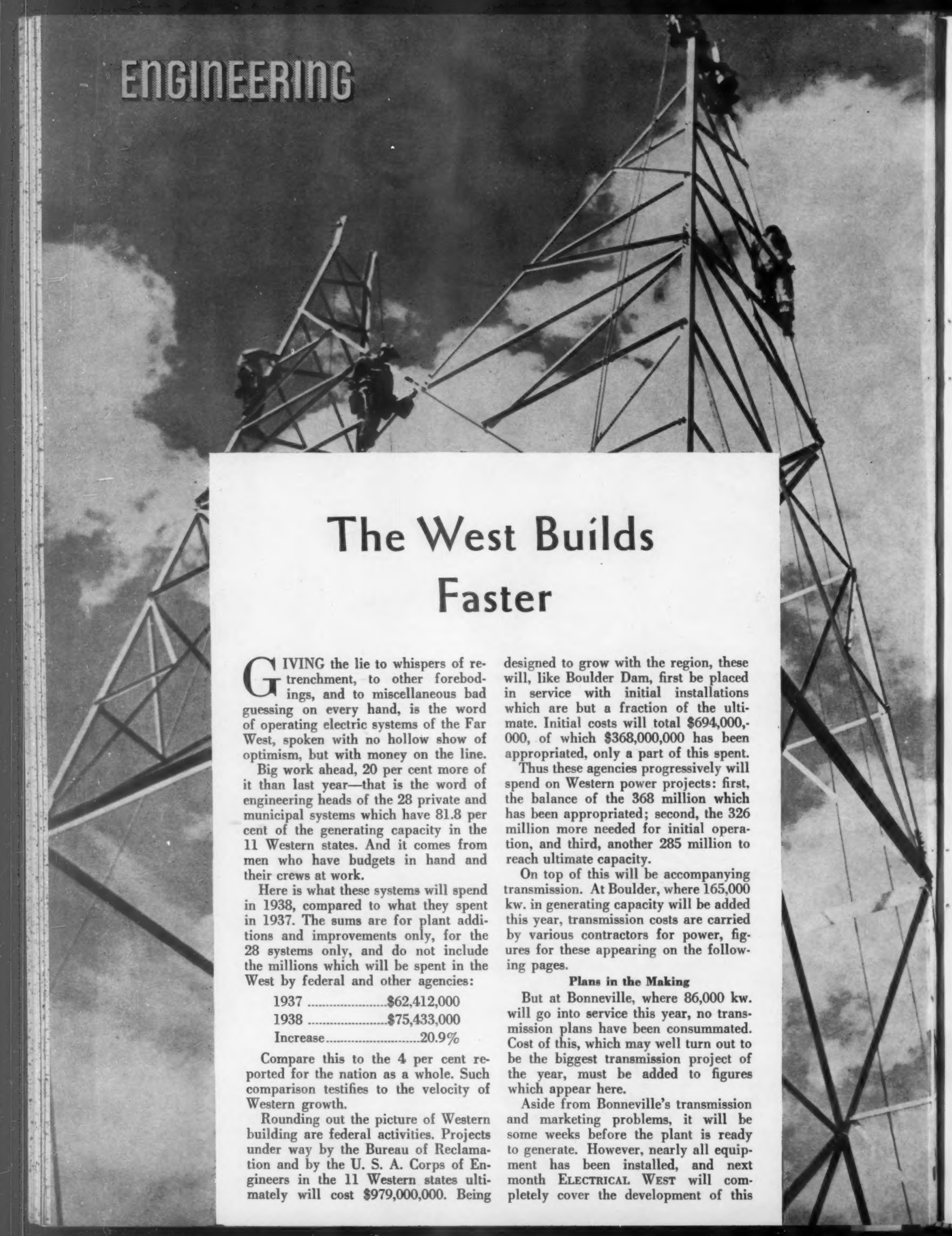
Summary

FROM the foregoing cross-section of industry opinion certain definite conclusions may be drawn as to future prospects, policies and problems. From these statements one senses the close interrelation and interdependence of all of the branches of the industry. Just as no chain is stronger than the weakest link, so it is that progress and prosperity of any single unit in the electrical business is linked to the growth and prosperity of all other units.

Most promising is the frequently expressed resolution to concentrate upon the essential daily job and to disregard vague fears. Yet there is no tendency to ignore basic controversial issues. Where these leaders have cited problems, they have at the same time suggested possible remedies. There is nothing Pollyannaish about the optimism which prevails. It is based on a solid foundation of opportunities which these men see. To meet the current so-called recession they urge more intensive and discriminatory salesmanship; more careful study of markets; more diligent combing for prospective users of electrical service, equipment and appliances.

They see a big promotional job ahead of the industry—a job to be undertaken by more intensified cooperative effort. They take a more realistic viewpoint of many of the enigmas which are holding back progress. They recognize that one of the noteworthy propositions for future solution deals with human relations—the creation of a better public understanding of the industry and its services and accomplishments.

Above all, one senses that here is a vital, progressive industry, conscious of its responsibilities, aware of its obstacles yet moving forward in full stride.



The West Builds Faster

GIVING the lie to whispers of retrenchment, to other forebodings, and to miscellaneous bad guessing on every hand, is the word of operating electric systems of the Far West, spoken with no hollow show of optimism, but with money on the line.

Big work ahead, 20 per cent more of it than last year—that is the word of engineering heads of the 28 private and municipal systems which have 81.8 per cent of the generating capacity in the 11 Western states. And it comes from men who have budgets in hand and their crews at work.

Here is what these systems will spend in 1938, compared to what they spent in 1937. The sums are for plant additions and improvements only, for the 28 systems only, and do not include the millions which will be spent in the West by federal and other agencies:

1937	$62,412,000
1938	$75,433,000
Increase	20.9%

Compare this to the 4 per cent reported for the nation as a whole. Such comparison testifies to the velocity of Western growth.

Rounding out the picture of Western building are federal activities. Projects under way by the Bureau of Reclamation and by the U. S. A. Corps of Engineers in the 11 Western states ultimately will cost $979,000,000. Being designed to grow with the region, these will, like Boulder Dam, first be placed in service with initial installations which are but a fraction of the ultimate. Initial costs will total $694,000,000, of which $368,000,000 has been appropriated, only a part of this spent.

Thus these agencies progressively will spend on Western power projects: first, the balance of the 368 million which has been appropriated; second, the 326 million more needed for initial operation, and third, another 285 million to reach ultimate capacity.

On top of this will be accompanying transmission. At Boulder, where 165,000 kw. in generating capacity will be added this year, transmission costs are carried by various contractors for power, figures for these appearing on the following pages.

Plans in the Making

But at Bonneville, where 86,000 kw. will go into service this year, no transmission plans have been consummated. Cost of this, which may well turn out to be the biggest transmission project of the year, must be added to figures which appear here.

Aside from Bonneville's transmission and marketing problems, it will be some weeks before the plant is ready to generate. However, nearly all equipment has been installed, and next month ELECTRICAL WEST will completely cover the development of this

project to date in a special 16-page pictorial section.

Another project, the details of which should be sketched in within the month, is that of the Sacramento Municipal Utility District proposing construction of a $13,500,000 hydro plant at Silver Creek.

This became likely last month when Pacific Gas and Electric Co. offered to withdraw court actions on validity of the district's $12,000,000 bond issue, if the district would abandon plans to condemn P. G. & E. distribution facilities in Sacramento. Details appear in the news section, page 80.

For the first time in six years P. G. & E. sought new capital Jan. 24, 1938, when it applied to the state for authority to issue and sell $15,000,000 in bonds, purpose of which, according to President J. B. Black, is to replenish working capital and provide additional funds for construction purposes.

Seattle City Light likewise took steps within the fortnight to finance its 1938 program, selling an additional $898,000 worth of bonds, thus bringing cash funds up to the amount required to make available a $3,000,000 PWA grant.

Year Past

Operating utilities last year confronted the need of more generating capacity—a need which had hung fire during the last years of the depression when loads turned upward with a boom. Result in 1937 was extensive additions, with steam coming in for a good share of appropriations.

San Diego Consolidated put in a 35,000-kw. turbine, Central Arizona added 12,500. Portland General Electric undertook extensive boiler modernization, and Pacific Gas and Electric put on a topping turbine—the last new to utility steam practice in the West. Top honors for technical advance go to Tucson Gas, Electric Light & Power, which installed a compact, mobile, "package" turbo-generator in conjunction with outdoor boiler.

Biggest hydro addition was Seattle City Light's Diablo plant. Half the capacity went on the line late in 1936, half last year, the total being 133,300 kw. British Columbia Electric Railway put a second 47,000-hp. unit in its Ruskin plant. Idaho Power crossed the finish line at year's end with two machines operating at its new plant at Upper Salmon Falls, increasing its capacity by 20,100 kw.

Among major transmission projects which got under way in 1937 were Southern California Edison's to Boulder, Washington Water Power's to Chelan, Seattle City Light's to Skagit, Lincoln County Power District's Boulder to Pioche, Metropolitan Water District's Colorado River Aqueduct line.

The Boulder-Pioche line was energized Sept. 1, 1937, this being made possible through cooperation of the Nevada-California Electric Corp., which leased a substation to the district on very favorable terms, and the Southern California Edison Co., which made available a bank of transformers.

Principal interconnections were Seattle City Light—Puget Sound Power & Light and San Joaquin-Edison. But the major interconnection job was that involving all interconnected systems in the Northwest, undertaken cooperatively to improve stability, increase workable capacity of the ties.

Fast growing loads almost everywhere put burdens on distribution capacity, special attention being given to regulation, particularly the application of static capacitors. Several systems were proceeding with conversion to secondary underground networks, numerous downtown buildings were put in the three-phase four-wire class.

Year Ahead

That all-round system improvement will be the rule for 1938 construction is evidenced by the full reports on succeeding pages.

Biggest single job will be that of the Los Angeles Bureau of Power & Light. Faced with the need for much more power, the Bureau has set aside $11,000,000 for either a new transmission line to Boulder Dam or a new steam generating plant, one or the other to be built this year.

Pacific Gas and Electric Co. will launch two important programs in 1938. First: The Feather River hydro development, which awaits only the approval of the Federal Power Commission. First in this $54,000,000 project will be a 68,000-kw. generating unit at Cresta, probably to be started this year. It will cost $9,500,000. Second: The series of steam plants which the company will build on industrial property. Construction will start in 1938 on the 34,000-kw., $5,000,000 steam unit to be built at the Associated Oil Company's refinery at Avon, California. About one-fifth of its capacity will serve Associated, the rest will be available to the P. G. & E. system. Both design and construction of an almost identical unit for Shell Oil Co. at Martinez, California, will start this year. Contract with Union Oil Co. for a similar unit at Oleum, California, is expected to be signed within a few weeks.

Salt River Valley Water Users' Association's 1938 budget contains a $450,000 item for a 7,000-hp. diesel.

The City of Eugene, Oregon, will purchase a $350,000 steam unit. Public Service Co. of Colorado plans boiler additions and perhaps a 4,000-kw. unit. Central Arizona Light & Power will spend $400,000 for an integral outdoor-type boiler. The Los Angeles Bureau will modernize a number of its hydro plants for 60-cycle operation, and jobs scheduled on other systems include substantial appropriations for improvements in governing.

Throughout California, load growth is stressing distribution facilities. San Diego reports that "change in character of residential load is moving power factor down, requiring more widespread use of capacitors in distribution systems." Rural loads in the San Joaquin Valley are bringing about similar practice. San Joaquin Light & Power Corp. in 1938 will add step-voltage regulators and make "extensive application of static capacitors."

For transmission, substations, other equipment, similarly heavy programs are scheduled, can be found classified in each company's report.

All systems with rural customers report this year's activities will equal those of last, when utilities (alone) in the 11 Western states spent $7,478,000 to build 2,462 miles of line. To this should be added the $3,705,000 which the Rural Electrification Administration has allotted to build 3,304 miles of line in the West.

Very briefly this is the outline of Western electrical construction for the year just past and the one to come. Details of the picture within this outline are drawn in the following reports of chief engineers.

These are arranged alphabetically by companies.

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Arizona Edison

Activities of Arizona Edison Co., Inc., classified by years, are as follows:

Fixed Capital Charges

	1937	1938
Generation	$174,816	$ 32,750
Transmission	64,862	.....
Stations and Equipment	87,295	11,630
Distribution	92,425	65,767
Other additions and improvements	19,764	32,769
Totals	439,162	$142,916

The installation of a gas engine in the Douglas plant was started in 1936. Most expenditures were made that year. It is, however, listed in 1937, when placed in service. It is 800 hp.

Similarly, three diesel installations are charged against 1938. Two of these are transfers, only one representing a net increase of capacity. The new unit, installed at Bisbee, will be 2,250 hp.

A 22½-mi. 44-kv., wood-pole transmission line was constructed between Bisbee and Douglas in 1937. Another line, 13-kv., 7½ mi. long, replaced one

of smaller capacity between Globe and Miami. No transmission is budgeted for 1938. The Bisbee-Douglas tie involved 1,200-kva. in additional substation capacity, the Globe-Miami line, 2,100 kva. in substation transformers.

Two 1,000-kw. frequency changers were installed for conversion of purchased power. Coolidge and Florence systems were changed from 25 to 50 cycles in 1937 at a cost of $19,343 to the company.—*D. B. McGregor, treasurer.*

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Arizona Power

Last year, Arizona Power Corp. spent $115,000 for new and improved facilities, the principal item, aside from all 'round system additions being the construction of 21.9 mi. of distribution line. Allocations of 1938 expenditures have not yet been made, but the sum budgeted for this year is $70,000.—*Malcolm M. Bridgewater, general superintendent.*

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Bureau of Reclamation

This is a brief review of Bureau of Reclamation projects involving present or future development of power.

Boulder Canyon

Delivery of firm energy from the Boulder Canyon power development to the cities of Los Angeles, Burbank, Glendale, and Pasadena was begun June 1, 1937, when the Secretary of the Interior notified these contractors that power was ready for delivery under terms of their contracts. Four generating units of 82,500 kva. each were operated by the Los Angeles Bureau of Power & Light for these four cities. The Nevada-California Electric Co. started taking power on August 16, 1937, under an interim agreement. One 40,000-kva. generating unit supplies this company.

During the latter part of 1937, the Boulder output was approximately 135,000,000 kw.-hr. per month. Two additional generating units of 82,500 kva. each are being installed for the use of the Metropolitan Water District of Southern California. These units are scheduled for operation June 1, 1938. Orders were placed for two additional generating units of the same capacity to be installed for the use of the Southern California Edison Co. These two units will go into service about June 1, 1939. The installation in Boulder Power Plant will then consist of nine main generating units, with a total capacity of 700,000 kva., which will be about 53 per cent of ultimate.

Delivery of power to the Southern Nevada Power Co., for use in Las Vegas, Nev., was begun March 17, 1937, and delivery to the Lincoln County Power District No. 1, for use at Pioche, Nev., and adjacent area, Sept. 1, 1937.

Columbia Basin

Rapid progress was made on the construction of Grand Coulee Dam on the Columbia River. Interior Construction Co. has been awarded the contract for construction of the upper part of the dam which will complete it to its full height. This contract will include construction of the west powerhouse building. Dam and powerhouse are scheduled to be completed in 1941. Specifications for the initial generating equipment will probably be issued in 1938.

Parker Dam

Construction of Parker Dam on the Colorado River near Parker, Ariz., was active during 1937, and it is expected that the dam and substructure of the powerhouse will be completed in 1938. Completion of the power plant will be deferred until there is a need for the power, half of which will be used by the Metropolitan Water District for pumping water through its aqueduct and the other half will be used by the Government for pumping on the Gila Project in Arizona.

All-American Canal

Construction was started on the substructures of four power plants at drops on the All-American Canal. Each of these structures combines a check and drop for bypassing water around the power plant with the substructure of the power plant. These four power plants are being designed for an ultimate installed generating capacity of 54,000 kva. The Imperial Irrigation District is proceeding with the completion of the superstructure of the power plant at Drop No. 4, and with the installation of one 12,000 kva. generating unit. It is expected that this unit will be ready for service in 1939. Completion of the other plants on the All-American Canal will be deferred until a market for additional power develops.

Kendrick

Construction of Seminoe Dam and power plant on the North Platte River in southern Wyoming was continued. Orders were placed for two generating units of 12,000 kva. each, for installation in the power plant, which is expected to be completed in 1940.

Power from Seminoe will be disposed of in the North Platte Valley and in Southern Wyoming and Northern Colorado. A main transmission line operating at 115,000 volts, is contemplated from Seminoe Dam south to Laramie and Cheyenne, Wyoming, with a branch extending south into Colorado for interconnection with the system of the Public Service Co. of Colorado, and also with the proposed Colorado-Big Thompson transmountain diversion project, and another branch extending northeast from Cheyenne to Scottsbluff, Nebraska, where it will interconnect with the present power system on the North Platte Project.

Central Valley

Construction of the Central Valley Project was started during the year, with preliminary work in progress on the construction of camps at the site of Shasta Dam on the Sacramento River; and at the site of Friant Dam of the San Joaquin River. Construction work on the Contra Costa Canal was started during the year. Specifications for a railroad tunnel to divert the main line of Southern Pacific R.R. around Shasta Damsite will be issued early in 1938, and this will be followed immediately by the issuance of specifications for construction of the Shasta Dam and power plant. The Shasta power plant is being designed for an ultimate installation of five main generating units of 70,000 kw. each.

The amount to be spent this year on this big volume of scheduled work is not at present known—*L. N. McClellan, chief electrical engineer.*

TWO NEW MACHINES will go into service at Boulder Dam this year, each adding 82,500 kva. to plant capacity. At right, one of the shafts is being turned. By the middle of 1939, nine units will be installed at Boulder—representing a plant capacity of 700,000 kva., or 53 per cent of the ultimate. The Bureau of Reclamation gives June 1, 1938, as the date when the Metropolitan Water District's machines will be in operation; Southern California Edison's two, one year later

B. C. Electric Railway

Construction by British Columbia Electric Railway Co. during 1937 included two major items, viz., addition of a 47,000-hp. hydro unit at Ruskin, and the improvement of distribution facilities in the East End of Vancouver, embodying the erection of a new substation in the Grandview district.

The new Ruskin generator will be a duplicate of the first, installed in 1930; the powerhouse, foundation and penstock tunnel for this second unit were constructed at that time. The job is scheduled for completion by October.

Underground 12,000-volt cable circuits are being laid from Main St. and Haro St. substations to the new Grandview substation. These will be continued, in 1938, to Horne-Payne receiving station at the city limits. Grandview substation building has been completed, and installation of electrical equipment is in progress.

For the usual light and power distribution, involving power loads of

moderate size, as well as commercial and domestic services, 4,000-volt, 4-wire circuits will be provided; heavy industrial loads on the Burrard Inlet Waterfront will be served by 12,000-volt feeders.

Primary voltage of the substation will be 34,600, and separate transformer banks will step this down to 4,000 volts.

In connection with the company's railway power plant, two installations of Hewittic type, 330-kw. mercury arc rectifiers were made. A further installation of this type but of 660-kw. will be made soon.

Railway power equipment of larger capacity is being installed at Fir St. substation; this consists of a 1,000-kva. synchronous converter, which will be supplemented early this year by another similar unit. The existing motor-generator will be moved to a new railway substation to be erected in the east end of the city.

On Vancouver Island, a program of renewing poles, wire, insulators and conductors on 30 mi. of 60-kv. lines was carried out during 1937, and substation capacity to the extent of 2,250-kva. was added to Bamberton substation, which supplies the plant of the B. C. Cement Co. This power customer is carrying out an extensive modernization.

This year will see the completion of the second unit at the Ruskin plant, the Grandview substation and other distribution improvements in connection with it, the railway substations referred to, and the continuation of wooden pole renewals on an extensive scale. — *A. Vilstrup, chief electrical engineer.*

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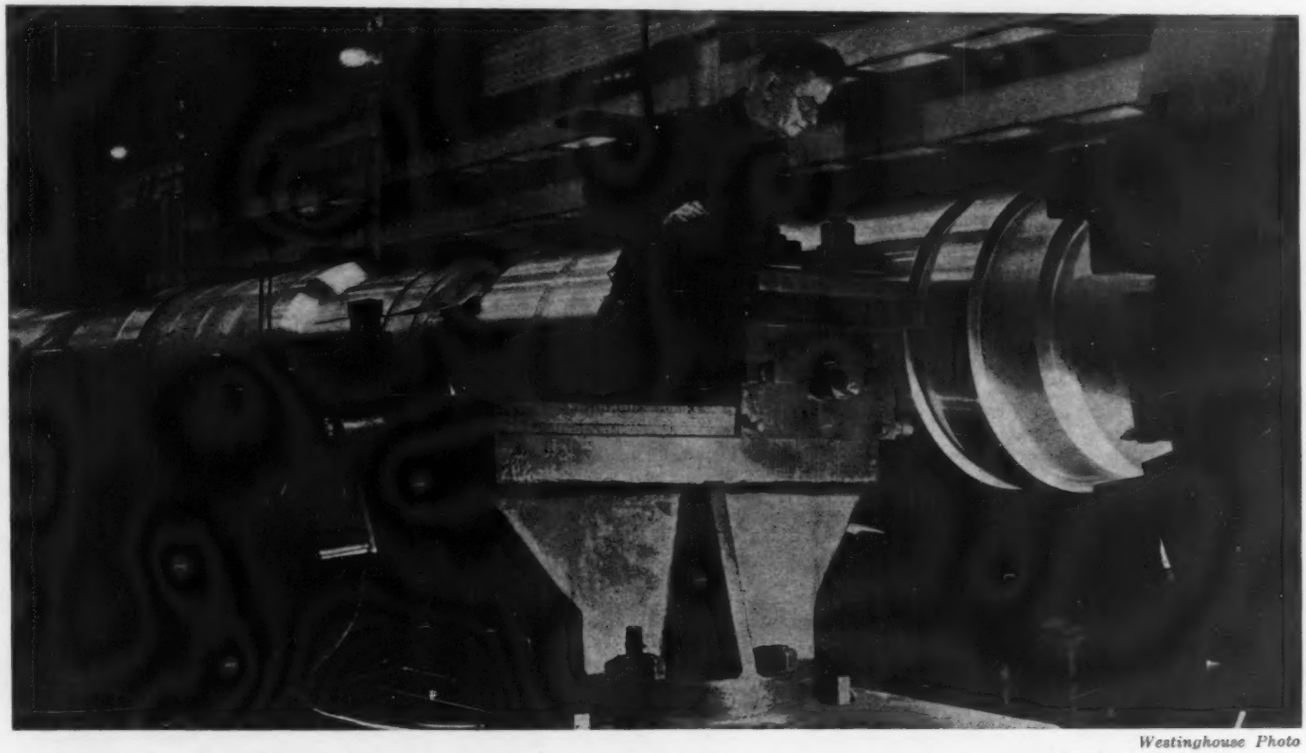
California Oregon Power

Briefly, plant additions and expansions of the California Oregon Power Co. for 1937 were as follows: generation, tailrace at Copco 2; transmission, rebuild of 45 mi. of 38-kv. and 66-kv. lines; distribution, added 75 mi. of lines; substations, added 800 kva. of capacity and 250 kva. of regulators.

Total spent for new and improved facilities was $700,000. Budgeted for new and improved facilities in 1938 is $600,000.—*J. C. Boyle, vice-president in charge of operation.*



Westinghouse Photo

Central Arizona L. & P.

Expenditures for additions and betterments by Central Arizona Light & Power Co. during 1937, amounted to approximately $957,000, as follows:

Generation

A 12,500-kw. General Electric turbo-generator was added to our Phoenix steam station at approximately $300,000, which included the necessary building extension, machine, condenser, auxiliaries, connections to water supply system, electrical connections, including 11-kv. outdoor substation bay for connection of this machine to Phoenix transmission lines.

Transmission

The 40-kv. transmission line from Phoenix to Buckeye was reconstructed to carry 66 kv. and was brought into the steam plant 4 mi. west of Phoenix instead of at Phoenix substation in the city. The Sycamore transmission line connection to the Arizona Power Corp. was rerouted for several miles, to bring it into the steam plant instead of to Phoenix substation.

Substations

A 66-kv. outdoor switching station was constructed at the steam plant to handle the Sycamore line and the Buckeye line and the 66-kv. equipment, as well as other equipment formerly at the Phoenix substation, was installed at the steam plant.

A new 3,000-kva. substation was constructed at Perryville on the Buckeye line in order to serve additional irrigation load. An additional 2,000 kva. capacity was added to the Second St. substation in Phoenix.

Distribution

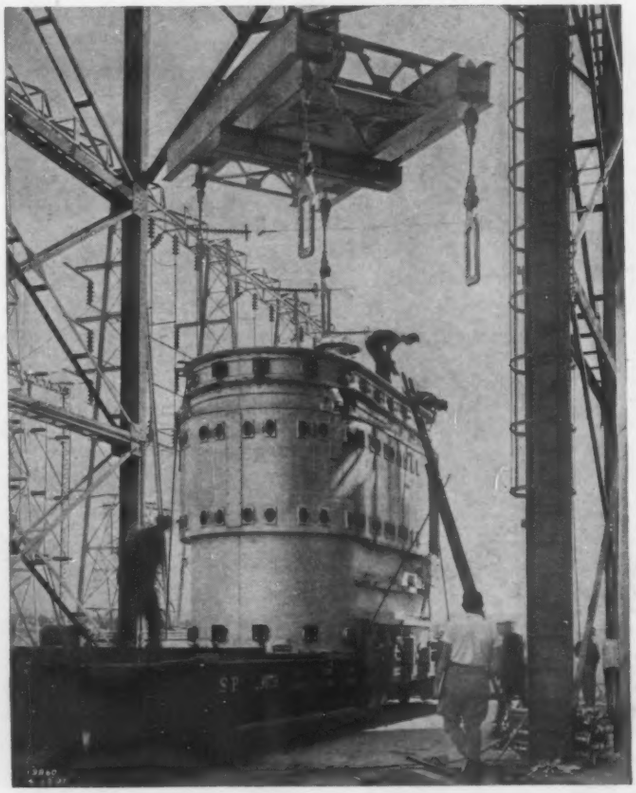
Additional distribution lines were constructed including tie lines, controls, and regulators necessary to meet the requirements of our increasing demand in Phoenix.

1938

The construction on budget for this year provides for expenditure of $768,000 distributed as follows:

Steam station, $400,000; this includes an integral outdoor type boiler with additional spray pond capacity and the necessary additional water connections.

Transmission, $60,000; a new tie line



INTERCONNECTION of Southern California Edison and San Joaquin Light & Power systems last summer involved the year's biggest moving job, 500 tons of transformers and appurtenant equipment being moved into Magunden switching station near Bakersfield to complete the 75,000-kva. tie. Here one of the 25,000-kva. transformers, stripped down to a mere 80 tons, is about to be unloaded from a flat-car. San Joaquin gained hydro capacity

to be constructed from the steam plant to Phoenix.

Other items are distribution, $189,000, and miscellaneous, $119,000.—*A. F. Moriarty, vice-president.*

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Coast Counties G. & E.

No new generating equipment was added to the Coast Counties Gas & Electric Co.'s electric system in 1937, and none is proposed for 1938.

Last year, 28 mi. of distribution line was added and it is estimated that at least 25 mi. will be built this year.

Additions to substation capacity are expected to increase from last year's 25 kva. to 3,250 kva. for 1938.

Capital expenditures for transmission facilities in 1937 totalled about $33,000, and between $100,000 and $150,000 is estimated for 1938.

The same for distribution purposes was about $254,000 in 1937; between $300,000 and $400,000 for 1938.—*A. E. Strong, general superintendent.*

Eastern Oregon L. & P.

With December estimated, last year's additions to the Eastern Oregon Light & Power Co. system were:

Generation: Deep-well pumping was installed at South Baker steam plant to provide condenser cooling water. Boiler furnaces were relined. A 3,000-ft. section of wood-stave pipe, installed in 1906, was replaced with 34-in. creosoted wood-stave pipe.

No substantial transmission additions were made. A 26-mi. rural distribution line was added. New substation capacity totalled 150 kva. of 22 kv.

Necessary distribution transformers and secondary copper was added to the Baker distribution system to furnish all heating load formerly supplied by the local gas plant, which was abandoned Dec. 1.

In round numbers, $63,000 was spent during 1937 for new and improved facilities. The 1938 budget for the same items is expected to be $70,000.—*O. D. Lanning, chief engineer.*

Eugene Water Board

Because of the addition of a 6,000-kw. steam unit, installation of which is scheduled to begin this year, probably extending into 1939, Eugene Water Board's electric system additions will total about $450,000 this year, compared to $100,000 last. No generation was added in 1937.

Transmission: added one 13-mi., 66,-kv. line in 1937; will raise voltage of whole transmission system from 44 to 66 kv. in 1938.

Distribution: (besides regular extensions and improvements) added one 2.3-kv., 300-amp. automatic feeder in 1937; will build one new automatic 11-2.3-kv., 750-kva. rural substation in 1938, and will strengthen the 11-kv. system by adding new circuit breakers and rearranging the present ones.

For the first ten months of 1937 the kw.-hr. consumption ran 14-per-cent ahead, and the kw. demand 12-per-cent ahead, of the same period in 1936. This increase was spread about evenly over the different classes of service.—*H. P. Currin, superintendent, Electrical Department.*

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Grays Harbor

Grays Harbor Railway & Light Co. has no construction program planned for the year 1938 other than the regular appropriation for minor capital expenditures such as: short extension of lines, the purchase of small transformers and the purchase of meters. This will probably amount to $12,000.

During the earlier part of this year we constructed about ½-mi. of 23,000-volt line and installed a 2,000 kva. bank of transformers for a plywood mill costing $16.000. This plant had been operating for ten years but load had increased. During the year we also constructed two short 6,600-volt rural extensions costing approximately $2,500. The blanket appropriation for 1937 was $11,000.

At present most of the local saw mills are closed down. However, conditions may change locally so that we will have more information to report regarding plant construction and extensions for the coming year.—*William S. Hill, general superintendent.*

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Idaho Power

Our system's 1937 construction program was essentially as follows:

Generation

Construction of a generating system at Upper Salmon, consisting of two 9,000-kw. hydro-electric units. Energy from this station is stepped up to 132 kv. for transmission to Shoshone Falls.

Construction of a generating station at Clear Lake, consisting of one 2,100-

kw. unit. Energy from this station is stepped up to 44 kv. and fed into our transmission network.

Transmission

Construction of approximately 31 mi. of 132-kv. line from the new Upper Salmon plant to Shoshone Falls. Changing conductor on 27 mi. of 44-kv. line between Swan Falls and Nampa from No. 2 equivalent aluminum to No. 2-0 copper. This last included replacing all pin-type insulators with modern insulators of somewhat higher voltage rating.

Distribution

Approximately 225 mi. of new primary distribution lines, 2,300 to 22,000 volts, were added during the year, and 142 mi. were cut over from 2,300 to 11,000 volts.

Substation

A total of 9,750 kva. of additional substation capacity was added to the system at four points, with numerous shifts of existing transformers to provide adequate capacity at other points and 27 feeder regulators were added to improve service.

37-38

The construction budget for 1937 totaled $3,300,000. The construction budget for 1938 has not been approved as yet, and the amount of improvements to be made is, therefore, uncertain. It is expected, however, that no additional power plant capacity will be added, nor any considerable amount of transmission lines constructed.

It is probable that between $300,000 and $400,000 will be added to the distribution plant account, and a few feeder regulators installed in substations. Some additional shifting of substation transformer capacity will be carried out, and possibly one or two banks of substation transformers added. *—H. L. Senger, chief engineer.*

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Los Angeles Bureau

Herewith is an outline first of actual activities of the Los Angeles Bureau of Power & Light in 1937, then of proposed activities for 1938, followed by comparative estimates of expenditures for the two years.

1937

Generation: miscellaneous improvements at various plants including reconstruction of 38 O.C.B.'s at Seal Beach and Alameda plants; construction of 27 cottages at Boulder City.

Transmission: ties to Stations E and F.

Distribution (overhead): 44 mi. of pole line; 7.3 circuit-mi. of 34.5-kv. line; 4,500 kva. of transformer capacity; (underground): 13 conduit-mi.; 56 duct-mi.; 110 cable-mi.; 6,000 kva. of transformer capacity.

Receiving stations: miscellaneous improvements to Stations A and B; construction of Station E; extension and reconstruction of Station F.

Distribution stations: new 34.5-kv. line positions in nine stations; installation of feeder and regulator equipment in eleven stations; increased transformer capacity totalling 79,000 kva. in fourteen stations; additions and betterments to fifteen former Los Angeles G. & E. stations.

Commercial stations: construction of thirteen stations, 4,130 kva.; increased capacity of 22 stations, 2,577 kva.; changed nine stations from 2,300 to 4,800 volts.

Industrial stations: construction of six stations, 2,800 kva.; increased capacity of five stations, 2,485 kva.

1938

Generation: reconstruction of 24 110-kv. O.C.B.'s at power plants Nos. 1 and 2; changing turbine runners for 60-cycle operation at various power houses; spillway gates at Drinkwater Canyon; fuel pump and automatic control at Seal Beach; fuel tank protection and bus protection at Alameda St.

Transmission: either a third line to Boulder or a steam plant at Harbor with double tie line between Stations B and D.

Distribution (overhead): 50 mi. of pole line; 15 circuit-mi. of 34.5-kv. line; 50,000 kva. of transformer capacity; (underground): 15 conduit-mi.; 60 duct-mi.; 120 cable-mi.; 7,000 kva. of transformer capacity.

Receiving stations: new O.C.B.'s in Stations A and B; construction of Station D, 120,000 kva.; construction of Station E.

Distribution stations: construction of seven new ones; additions and betterments.

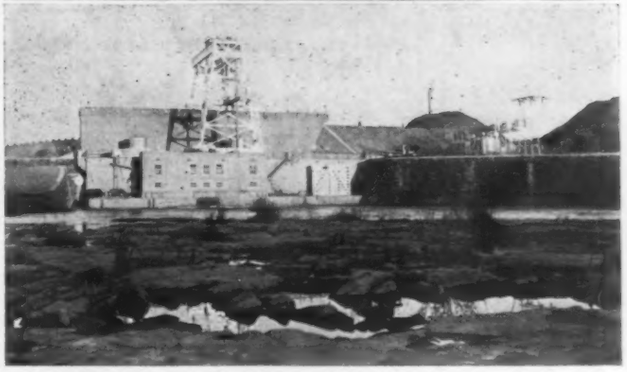
Commercial stations: proviison for an indefinite number.

Industrial stations: same as preceding.

Estimated Expenditures

	1937	1938
Construction — generation, transmission, station, miscellaneous	$4,500,000	$ 7,790,000
Third Boulder line or steam plant and tie	.....	11,000,000
Distribution (except 34.5 U. G. lines)	3,000,000	3,300,000
34.5-kv. underground lines	200,000	1,500,000
Total	$7,700,000	$23,590,000

HYDRO CAPACITY to the extent of 18,000 kw. was added to Idaho Power Co.'s system at year's end with the commissioning of its new plant, with two outdoor machines, at Upper Salmon Falls on the Snake River, Idaho. Although potentialities of this power site had been recognized a generation ago, construction did not get under wa until February, 1937. First unit was ready just seven months later, use of prefabricated concrete forms allowing this schedule



Although the million and a half is budgeted for underground lines this year, it is not expected to be entirely used.——*E. F. Scattergood, chief electrical engineer and general manager.*

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Montana Power

During 1937, work progressed continuously on the first unit of the Flathead hydro-electric development. The 200-ft. arch dam was practically completed, the pressure tunnel, 700 ft. long and 23 ft. in diam., was 75 per-cent completed and the power house had progressed to a point where equipment was being installed. The first unit of this plant will have a capacity of 56,000 kw., and a second unit of equal size, to be installed later, will complete the plant.

A transmission line, 150 mi. long, from the Flathead plant to Anaconda, was completed. This line is designed for 161 kv. and carries 350,000-circ.-mil. copper conductors. It is operating temporarily at 100 kv.

A 50,000-volt line from our Madison plant to Bozeman was increased in capacity by changing the conductors from No. 4 to 115,000-circ.-mil. for a distance of 30 mi. A 50,000-volt line was constructed from Anaconda to the Flint Creek plant, a distance of 20 mi. This will operate, for the present, at 22 kv.

At Billings, a new outdoor 50,000-volt substation having a capacity of 7,500 kva. was installed, together with a 5,000-kva. synchronous condenser.

Total expenditures were as follows:

Generation	$4,044,000
Transmission and Substations	472,000
Distribution	629,000
Other	128,000
Total	$5,273,000

For 1938, the principal items of construction are planned as follows:

Completion of first unit of Flathead plant.

Installation of a 5000-kva. substation at Piedmont to transform from 100 to 50 kv., and construction of 15 mi. of 50-kv. line to connect this substation to a 50-kv. line which now extends from the Madison plant to Dillon, with a branch to Twin Bridges.

The 100-kv. substation at Missoula will be increased in capacity by 6000 kva., and generally reconstructed.

At Thompson Falls power plant, it is planned to change the connections of the step-up transformers from delta to Y. The 100-kv. windings will be connected in parallel for 50 kv., and 1,000-kva., single-phase transformers will be connected as boosters in the ground leg of each main transformer, raising the voltage of each leg of the Y connected banks to 63,000, corresponding with the line voltage of 110,000. Total transformer capacity will thus be increased from 33,750 to 42,750 kva.

Estimated expenditures will be as follows:

Generation	$2,232,000
Transmission and Substations	117,000
Distribution	385,000
Other	82,000
Total	$2,816,000

Bulk of the decrease is in the figure for generation.—*H. H. Cochrane, chief engineer.*

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Mountain States Power

Following is information concerning additions to Mountain States Power Co. properties during 1937.

Generation, added 750 kva. at Stayton hydro plant; transmission, built 14.5 mi. of 66-kv. line; stations and equipment, increased inter-connecting capacity at West Salem with Portland General Electric Co. from 15,000 to 20,000 kva.; distribution, 105 mi. of line.

Value of this work was $733,000 not including $16,400 for autos and office equipment. We are unable as yet to furnish like information concerning our program and budget for 1938.—*G. McClellan, chief engineer.*

Nevada-California

Expenditures authorized by the Nevada-California Electric Corp. in 1937 for new and improved facilities were:

Generation	$ 39,000
Transmission	532,000
Distribution	1,343,000
General	60,000
Totals	$1,974,000

Principal items among these groups were:

Generation: conversion of hydro-electric plant operation to semi-automatic with remote metering; additional capacity at isolated generating station.

Transmission: additional switching facilities and conversion of indoor switching station to outdoor type; installation of automatic sectionalizing equipment on two main lines; modernization of relay equipment on either end of two main lines; modernization of arrester equipment at important substations.

Distribution: construction of 16 mi. of 33-kv., three-phase lines to provide loop-line service to two important areas; construction of approximately 170 mi. of distribution lines of 4,600

BONNEVILLE'S navigation lock was opened to shallow bottoms last month. Generation is scheduled to begin this year, but transmission facilities must be provided first. One house unit is operating

volts and below, including about 100 mi. of line classified as rural; installation of voltage regulators on main feeder circuits.

Substations

Two new transmission line substations were constructed to serve important and rapidly growing areas (added 3,000 kva.). Conversion of indoor type substation to outdoor type, increase station capacity and addition of automatic line sectionalizing equipment (added 650 kva.).

Installation of 2,000-kva. synchronous condenser at main line substation serving important area.

BOULDER began generation of firm power in June, 1937. With the water accumulating in Lake Mead, it will be prepared to supply other agencies: Southern California Edison, Metropolitan Water District

Enlargement of transmission line substation to provide for bringing in power allotment from Boulder power plant, including installation of two 7,500-kva. synchronous condensers, 37,500 kva. in transformer capacity and auxiliary equipment.

Enlargement of substation capacity at station serving large and important area (added 2,250 kva.). Construction of several new distribution line substations and enlargement of existing substations to provide for rapidly developing load (increase in capacity totalling 4,800 kva.).

Considerable line construction has been carried on during the year in connection with the relocation and reconstruction of main 17,500 and 33,000-volt distribution feeder circuits.

1938

Budget tentatively set up for new and improved facilities:

Generation	$ 23,100
Transmission	193,500
Distribution	762,000
General	192,900
Totals	$1,171,500

Expenditures tentatively set up in the 1938 construction budget include strengthening of main transmission lines by rebuilding portions subjected to severe storm conditions, construction of new distribution substations and increasing capacity of existing substations, installation of new line-sectionalizing equipment and installation of additional and larger regulators at important substations. The 1938 budget also contemplates continuation of the rural electrification program carried on during the past two years.—*R. H. Halpenny, electrical engineer.*

Northwestern Electric

The Northwestern Electric Co. during 1937 expended approximately $282,000 in addition to electric and steam heating system capital. No major generation, transmission, or substation jobs were undertaken during the year. A number of minor improvements in the nature of system modernization were accomplished and our usual urban and rural distribution extension program carried on. Our territory is generally well served and covered with a network of distribution service lines. Our extension program consists mainly of filling in with short branch lines to serve new customers in both the rural and urban territories.

A substantially similar program has been outlined for 1938 and an estimated expenditure for additions to capital in the amount of $240,000 has been recommended.—*E. F. Pearson, chief engineer.*

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Pacific Gas and Electric

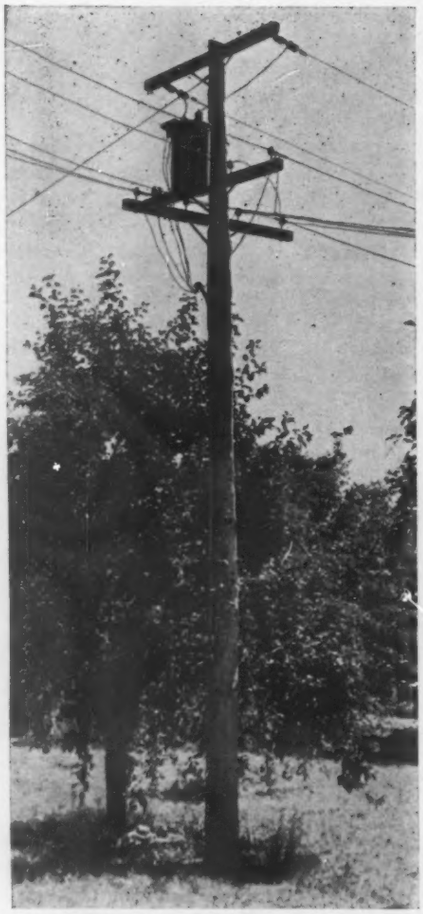
With the exception of 1932, growth of electrical load of the consolidated Pacific System has been positive. Because of a power surplus lasting through 1936, and addition of an interconnection with the Southern California Edison Co., no new generating capacity was added after 1931. Load upturn commenced in 1933, with a substantial average increase. Consequently programs looking to increased capacity have been advanced.

Generation

The year 1937 saw the Southern California interconnection made and the construction of a 50,000-kw. addition to steam Station "C" begun in Oakland. Substantial load growth in the San Francisco Bay area, coupled with the prospective requirements of the San Francisco Bay Bridge railway electrification and the Golden Gate International Exposition, indicated the need of additional system generating capacity in the region. This installation, including a modernization of switching facilities at that point and other related work, will total about $4,900,000. The new unit is expected to come on the line during the summer of 1938.

With the above construction in progress, the opportunity was taken to add a 3,500-kw. high-pressure unit to an existing 12,500-kw. turbo-generator, and to modify the latter for cross-compound operation with the small unit. New auxiliary equipment was also introduced.

A marked innovation in western steam plant practice has taken place in that arrangements have recently been completed for the construction of a new 40,000-kw. steam plant at the Avon



RURAL construction by 24 Western utilities last year totalled 2,462 mi. of new lines. This year they plan to build the same amount. In addition, REA has allotted $3,705,000 to Western projects

refinery of the Tidewater - Associated Oil Co. This plant will supply the heavy process-steam requirements of the refinery, will carry its electric load, and in addition will furnish some 35,000 kw. for general system uses. At the close of the year the design of the plant is just being started, with the completion of the construction expected early in 1939. Cost will be about $5,000,000.

Arrangements also have been concluded for a similar 40,000-kw. plant at the Martinez refinery of Shell Oil Co. Design for this will proceed during 1938, with completion scheduled early in 1939. This likewise will cost some $5,000,000.

In the field of hydroelectric development, the company has submitted to the Federal Power Commission, a plan for a comprehensive development of the North fork of the Feather River, between its Caribou and Big Bend plants (comprising six plants). Subject to the approval of the Commission of the general plan, construction will first be undertaken on Cresta, with an installed capacity of 68,000 kw. requiring an investment of $9,500,000 out of the total of some $54,000,000 on the river. The design and construction of this plant is expected to start during 1938 with completion perhaps in 1941. Depending upon load growth and other factors, the next plant for consideration will be Pulga with an installed capacity of 80,000 kw. and an estimated cost of $9,300,000.

Among smaller items the reconstruction of the Phoenix plant and its conversion to automatic operation next year is possible.

Transmission

Developments of late having been steam-electric, little major transmission work resulted. Load requirements in our Coast Valleys Division, however, prompted plans for the conversion of a 60-kv. circuit to 110-kv., and the installation of a second 110-kv. circuit between Morgan Hill and Salinas and the construction of a new 110-kv. circuit between Salinas and Soledad, a total of 62 circuit mi. Materials have been ordered preparatory to early construction in 1938. This work is anticipated to cost $445,000.

A 60-kv. line, 35 mi. long, is being planned to serve the Sierra Pacific Power Co. at Summit.

With the Feather River development given Federal approval, some $2,600,000 will be required for major transmission including terminal substations for the first plant, and an additional $4,200,000 if Pulga is brought in. All would be expended during the next two to four years. Transmission facilities for the full development will cost some $20,000,000.

For the first time, the company is undertaking a high - tension underground transmission cable. This cable, 60,000-kw. capacity, ultimately to operate at 120 kv., connects Station C and its new 40,000-kw. turbo-generator with Station X, Oakland, a major point of connection with the former Great Western Co.'s hydro system. Sections of several manufactures, but all of the oil-filled type, are being installed in this 3.2-mile tie, costing $300,000.

Considerable transmission maintenance, including vibration damper modernizations on major lines, was carried through 1937 and will continue through 1938. Cost may well reach $100,000 during 1938.

Substations

During 1937 two new distribution substations, M and N, were designed and practically completed, and substation J increased in capacity, in the San Francisco area. In East Bay territory, three outdoor substations in new residential districts are under construction. To complete this group will require $500,000. Installation of underground distribution cables during 1937 added at least $300,000 to the above.

Rather unusual problems are being solved in the design and construction of three new substations for the supply of power for the San Francisco Bay Bridge railway electrification. Rectifier and control equipment is now on order, and the field construction will start soon. Total expenditure of $1,800,000 is estimated, the bulk of it this year. Plans to extend service to the Golden Gate International Exposition will involve $457,000 this year. Work is now underway.

In Sacramento, Stations R and S are about to be started, and new distribution substations will follow at Auburn and Yuba City. Combined cost: $250,000. Six or more new high-voltage substations scattered through the territory are programmed for early construction in 1938. These are expected to cost an additional $850,000.

AGRICULTURAL CUSTOMERS in the West increased by almost 14,000 last year, while increased demand put heavy burdens on many distribution systems

Many general substation improvements and modernizations were made throughout the system in 1937. A number of transformer banks were shifted to give increased capacity. At other points regulators and new switching equipment were installed. While none

of these changes was extensive in itself, the aggregate was considerable. A similar volume of similar work is to be expected for this year, that is, if load growth continues, which up to recently it gave every indication of doing.

Increased rural distribution in 1937 required the construction of 3,600 miles of lines. At least equal volume will be involved in 1938 extensions, although it is difficult to estimate this in dollars. Special efforts toward minimum-cost rural lines will be continued for their encouraging effects upon rural utilization.

Conclusion

In setting up programs for new capacity, past policy of providing combination steam and hydro is being followed. However, flexibility is being maintained particularly with respect to hydro proposed for the Feather River. This development will be made in steps, timed to take account of changes in anticipated growth and the introduction of power from the Central Valley project.

The inauguration of a policy to employ process steam-electric plants signalizes the desire to effect closer cooperation with industry and may be taken as an expression of the company's faith in the general industrial future of California.—*A. H. Markwart, vice-president in charge of engineering.*

TRICKIEST piece of equipment was that acquired by Nevada California Electric Corp. It rivals the fire department's best. Rising to 52 ft., it is used to keep trees along the company's West Riverside lines in proper trim

Portland General Electric

The 1937 load of the Portland General Electric Co. was approximately 50,000,000 kw.-hr. in excess of the 1936 load. Expenditures for new construction during 1937 amounted to $1,250,000. It is anticipated that the 1938 increase in system load will be 70,000,000 kw.-hr. over the 1937 load.

There has been budgeted for construction purposes for 1938, $1,750,000. Approximately 75 per cent of this will be for increases in transmission and distribution facilities. — *Walter Brenton, chief engineer.*

Public Service of Colorado

Business in the Rocky Mountain West started off well in 1937. It is somewhat regrettable that the year ended less actively. The year did, however, make a rather fortunate showing so far as the Public Service Co. of Colorado is concerned.

With respect to its additions and betterments, the company showed $2,700,000 for 1937, owing to the fact that a new 25,000-kw. turbo-generating unit was put on the system in November. Other generating improvement and line construction added to the company's activity.

It should be stated, however, that the above expense and activity began as far back as 1934, and that completion brings plant properties comfortably ahead of present demands.

It was thought that the 1938 construction budget would not be a large one, on account of the present capacity of the system. However, there will be some new boiler installations at the Valmont plant; possibly a 4,000-kw. turbo-generator at Alamosa; and reconductoring and re-insulation of the Boulder Canyon-Denver Terminal 100-kv. line.

Regular extensions and improvements in transmission, distribution and substation facilities, of course, are not included in budgets of the foregoing items. But it is not thought that they will be out of the ordinary if indeed they are up to the customary annual expenditures along that line.—*A. H. Heitzler, superintendent electrical dept.*

Puget Sound P. & L.

The 1937 construction program of Puget Sound Power & Light Co. has totaled over $2,000,000. Two units at our Electron plant were rehabilitated and about 11.4 mi. of 55,000-volt line was constructed to relay certain points formerly served from a single line. A net increase of 7,600 kva. in substation capacity was distributed between several locations and a 25,000-kva. synchronous condenser was added to the Beverly Park switching station, near Everett. About 330 mi. of rural lines have been constructed during 1937 and line transformers and metering equipment for 8,200 customers have been added.

Because of conditions beyond our control no final determination has been made of the 1938 construction budget. —*G. E. Quinan, chief engineer.*

Salt River Valley

The following are funds expended for improvements and additions during 1937 and contemplated expenditures for 1938 by the Salt River Valley Water Users' Assn.:

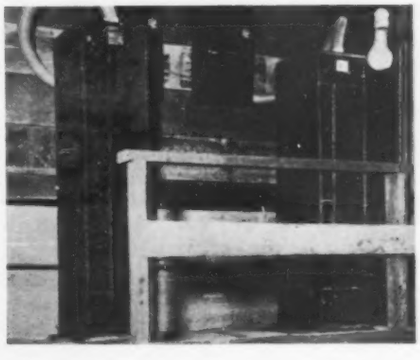
	1937	1938
Hydro Power Plants	$ 15,000	$ .....
New Diesel Plant, 7000 hp.	.....	450,000
Substations	75,000	50,000
Transmission	85,000	15,000
Distribution, Rural	100,000	75,000
Miscellaneous	25,000	15,000
Total	$300,000	$605,000

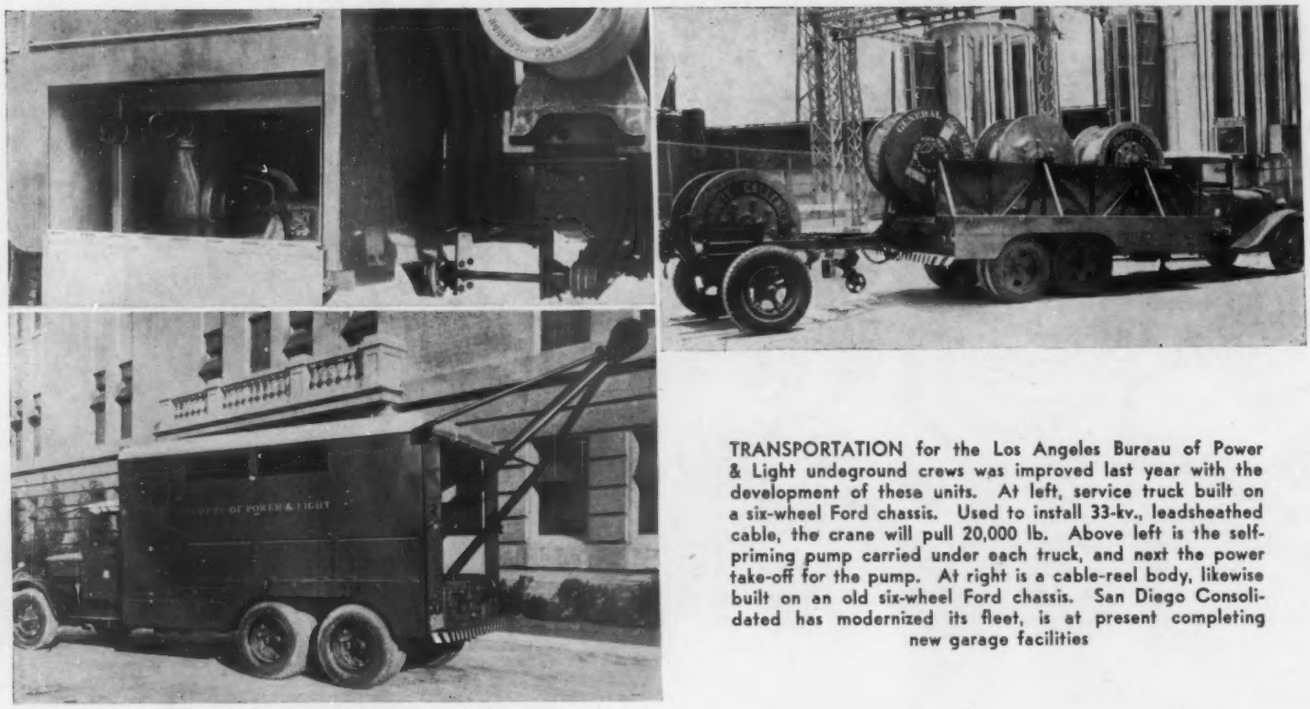
In the above figures are costs for a modern relay system, 30 mi. of 11,000-volt lines already built and 15 mi. contemplated for 1938, 15 mi. of rural lines built and the same distance contemplated for 1938. Also 25,000-kva. capacity added to present substations, with 15,000-kva. capacity contemplated for 1938.—*F. L. Roe. supt. of power.*

San Diego Consolidated

During the past year San Diego Consolidated Gas & Electric Co. completed the largest single addition to its generating facilities yet undertaken. This includes a 35,000-kw. General Electric turbo-generator and two 200,000-lb.-per-hr. Babcock & Wilcox integral-fur-

CAPACITORS found wide application last ear. Several systems report that the demand for such regulation is increasing. Here are two installed by a customer. They already have paid for themselves by gaining a more favorable rate for this California Gold mine





TRANSPORTATION for the Los Angeles Bureau of Power & Light underground crews was improved last year with the development of these units. At left, service truck built on a six-wheel Ford chassis. Used to install 33-kv., leadsheathed cable, the crane will pull 20,000 lb. Above left is the self-priming pump carried under each truck, and next the power take-off for the pump. At right is a cable-reel body, likewise built on an old six-wheel Ford chassis. San Diego Consolidated has modernized its fleet, is at present completing new garage facilities

nace type boilers at Station B. This brings total capacity of the station to 99,000 kw. The new unit was placed in service in December, 1937.

Total net additions to capital for the year 1937 were approximately $3,500,000.

No important extensions to transmission facilities were installed during the year, although one new 33-kw. line was run between stations B and F.

About 70 mi. of distribution lines were installed.

The company now has under construction a new 12,000-kva. substation in San Diego to serve the Hillcrest area. Although of reinforced concrete construction, with all apparatus housed, the exterior will be that of a typical California residence, so that it will match surrounding homes.

In the suburban areas new substations have been erected at Lakeside, Vista, Encinitas and Del Mar. With an increasing density of load, it is being found desirable to use 4-kv. distribution more widely in agricultural areas rather than 12-kv. with individual customer stations.

Programmed

During 1938 the company will complete a new electric meter test and repair building, and likewise a new garage, 100x200 ft., in San Diego. These are under construction. Additional service buildings are contemplated at Escondido, and an office building at Oceanside.

No generating facilities or transmission lines of any magnitude are planned for 1938. Several additional suburban substations will be installed and certain San Diego substations will be changed over from manual to supervisory control.

Line extensions into the agricultural and recreational areas will be continued as load growth may warrant. Various experimental lines, using improved types of construction, designed to cut costs without sacrifice of safety or continuity of service, have proven successful, and additional lines of this type will be installed.

Capacitors Needed

A gradual change in the character of residential and other loads which, during the past few years, has caused a slow but sure decrease in power factor, will be counterbalanced by a more widespread use of capacitors in distribution systems.

The total capital expenditures for 1938 will approximate $1,500,000.—*L. M. Klauber, vice-president in charge of operation.*

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San Joaquin Light & Power

The tentative electric construction budget for the combined system of San Joaquin Light and Power Corp. and Midland Counties Public Service Corp. has been prepared. It indicates that total construction expenditures for 1938 will probably exceed the actual total attained in 1937. Proposed for new construction and replacement is $3,810,000, compared to $3,516,000 in 1937.

No extensive reconstruction of, or additions to production plants are contemplated. The interconnection made during 1937 between the San Joaquin system and the Southern California Edison Co. system of 75,000-kva. capacity will provide sufficient power to take care of the combined system growth. Therefore expenditures at production plants cover only minor improvements and replacements.

Transmission line construction for 1938 is expected to approximate $275,000 more than in 1937. The 1937 program provided for construction of 15 mi. of new 70-kv. line necessary for the interconnection. Conductor was changed on the 70-kv. line from Kern Canyon power house to Magunden substation. During 1938, it is proposed to construct a new 110-kv. line, to cost about $250,000, from LeGrand to Mendota substations, a distance of 40 mi., and to make a number of substantial improvements to the 70-kv. system. It is also proposed to rebuild the 70-kv. line from Santa Maria to the present Los Alamos substation and to extend it on to a new substation site near Zaca. Both the extensions from LeGrand to Mendota and from Santa Maria to Zaca are required on account of the growth in electric load at the destinations.

Substation construction for 1938 will require expenditures almost $200,000 greater than in 1937. This is because work in 1937 was mostly relocation of existing transformer capacity to follow changing load. Any growth of load at all will require additional substation transformer capacity. Therefore the program for the coming year provides for the purchase of approximately 65,000-kva. in transformer capacity. Of this, 50,000 kva. will be located in the rebuilt Mendota substation, the remainder in Dairyland substation, through which latter point the new 110-kv. line from LeGrand to Mendota will pass. The replaced transformers at Dairyland and Mendota will be moved to other locations.

It is expected that distribution line improvements and extensions to serve new electric load will be somewhat less in 1938. Total expenditures for this class of improvement will approximate $2,268,000 in 1938, compared to $2,460,000 in 1937. This relatively small decrease is on account of extraordinary growth in 1937 but a more normal rate in the coming year. Included in both the 1937 program and that anticipated for 1938 are installations of step voltage regulators located along distribution lines, and it is expected that during 1938 rather extensive application of static condensers to the distribution system will be made.

Electric maintenance for the combined system ran approximately $394,000 in 1937. The anticipated maintenance outlay for 1938 is $410,300. The growth in this item is, of course, simply the natural result of system growth.—*L. J. Moore, executive engineer.*

Seattle City Light

Early this year, the City of Seattle Department of Lighting completed and placed in service, the second of two 95,000-hp. vertical hydro-electric generating units at Diablo power plant. (The first of these was put in service in the fall of 1936).

Work was also started, by contract, on the construction of Ruby Dam (Skagit River) to an initial height of 195 ft. This will provide additional storage for the Gorge and Diablo plants on the river below, and ultimately, for a third plant at Ruby. Work done during 1937, has been of a preliminary nature. Construction will be continued through 1938 and 1939, until the present contract is completed.

Ultimately, the dam will be built to a height of 640 ft., and will supply storage of approximately 3,000,000 acre-ft. of water.

Transmission

Work is under way on the erection of a new double-circuit, 230,000-volt transmission line, approximately 121 mi. in length, from the Skagit Project to the South substation in Seattle. This is scheduled for completion this summer or fall.

An intertie line 4-mi. long, 55-kv., was built to connect the municipal system with that of the Puget Sound Power & Light Co. This line was built by the private company, but the City will have a half interest in the poles and space for distribution circuits.

Distribution

There has been added to the distribution system: 22.45 mi. of 2,500/4,330-volt primary overhead circuits, 21.21 mi. of 120/240-volt secondary circuits, 1,717 kva. in additional distribution transformers.

The amount of this work during 1938 cannot be estimated accurately at this time, but will not be greatly different from the amount done during 1937.

Substations

Construction was started during 1937 on the South receiving substation to step down power from the new double circuit, 260-kv. transmission line from the Skagit.

Included in the first installation are one 60,000-kva., three-winding, step-down bank, one 30,000-kva. hydrogen-cooled, synchronous condenser, and switching equipment for fourteen 26-kv. circuits. This work is approximately half finished, and will be completed in 1938.

An additional, 8,000-kva. air-cooled synchronous condenser is now being installed in the old South substation, and should be in operation by the end of the year.

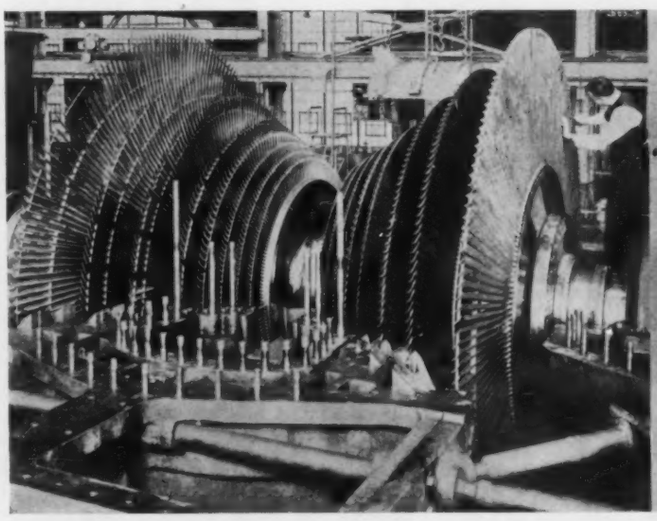
A 30,000-kva. bank of transformers, with load ratio control, was installed at the North Receiving substation to complete the intertie with the Puget Sound Power & Light Co. mentioned above.

One channel of carrier current equipment recently has been purchased from General Electric Co. for communication between Seattle and the Gorge power house, and an additional channel for communication between Gorge and Diablo. This has not yet been installed.

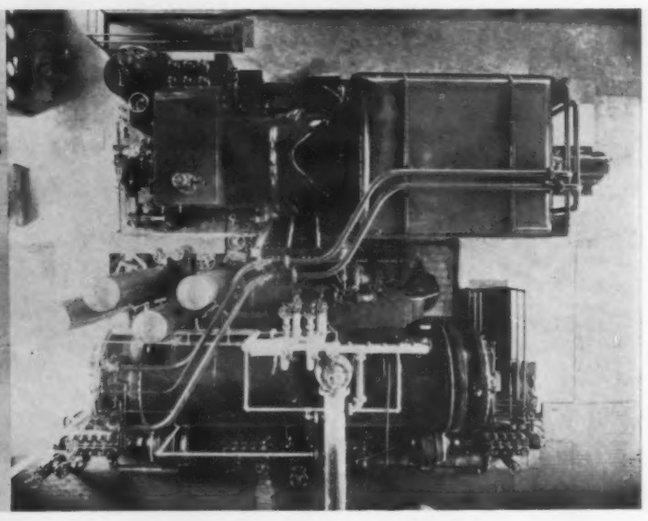
Construction Costs

Approximately $3,240,000 will have been spent for construction during the year 1937. Construction planned for 1938 will cost approximately $4,660,000.—*W. J. McKeen, acting superintendent of lighting.*

STEAM ADDITIONS were extensive in 1937. Several new machines went in service, and several boilers enlarger



TUCSON'S TURBINE shown here with its condenser (heaters between) was an achievement in compactness and light weight



Sierra Pacific

Construction expenditures during 1937 in Sierra Pacific Power Co.'s electric department total about $415,000. Principal transmission line items were 65 mi. of 60-kv. line from a point near Mill City, Nev., northeasterly through Winnemucca to the Kelley Creek Mine; 10 mi. of 60-kv. line between Norden Summit and Truckee, Calif., and 12 mi. of 23-kv. line southeasterly from Minden, Nev., to a new tungsten mine. Though only about 10 mi. of new distribution pole line were added, expenditures for transformers, meters, services and copper replacements and additions on the distribution system were the largest in the company's history. Three new substations were connected with a total capacity of 3,000 kva.

The 1938 budget is not yet approved, but tentative plans indicate a total expenditure of about $550,000. The new Summit-Truckee 60-kv. line will be extended about 20 mi. to the Washoe receiving substation and 60-kv. regulator capacity added. Switching and protective equipment will be added at Washoe. A 5,000-kva. transformer bank, additional regulators, and a 4-kv. feeder circuit are to be installed at Reno substation. A new 1,000-kva. transformer bank is scheduled for Carson City substation. It is expected that miscellaneous additions to the distribution system will be on about the same scale as this year.

A major item will be the purchase of Independence Lake and construction of dam and outlet works to develop 20,000 acre-ft. of storage for winter use through the hydro plants.—*V. D. Armstrong, engineer.*

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Southern California Edison

No additional generating equipment was added to the Edison system during 1937 other than the 25,000-kw. Diesel plant at Vernon, which is now connected to our system. Transformers were installed to pick up the Vernon load from the transmission system, and this plant will be operated as a stand-by.

The interconnection with San Joaquin Light & Power Corp. (capacity, 75,000 kw.) being for 60-cycle operation, it was necessary to revamp the whole relay scheme on the 220-kv. lines between Big Creek and Magunden, for 50 or 60-cycle operation. Thirty of the old 220-kv. oil circuit breakers were modernized to increase the interrupting capacity and speed.

Work began early in 1937 on the Boulder-Chino transmission line. Approximately 65 per cent complete in January, the line should be ready for operation early this summer. This is a single circuit, 220-kv. line, 233 mi. long. It will carry two overhead ground wires from end to end and will be equipped with Peterson coils at Boulder and Chino.

Work is in progress on the Chino Substation, the first receiving station on this end of the Boulder line. Deliveries of major equipment will be made early in 1938 so that the station will be ready for service by mid-summer. This station will have 75,000 kva. transformer capacity and a spare, together with a 50,000-kva. synchronous condenser with its transformers and switching equipment.

During 1937 we constructed about 300-mi. of distribution lines, added 75,000-kva. transformer capacity in addition to the interconnecting bank at Magunden.

Capital expenditure for 1937 was approximately $7,000,000. Estimated capital expenditure for 1938 is $10,000,000.

This year we expect to extend the Boulder-Chino transmission line 27 mi. into the center of Orange County, where the second receiving station will be built. Larger items of equipment for this station, consisting of a 75,000-kva. bank of transformers and a spare, a 50,000-kva. synchronous condenser together with its transformers and switching equipment, and 66-kv. switching equipment for ten lines, will be purchased in 1938 so that this station may be ready for operation in the summer of 1939.

In 1938, in addition to the 75,000-kva. bank at Chino, we plan to increase the substation transformer capacity on the system by 65,000 kva.

New horsepower connected to the system during 1937 exceeded the estimate made a year ago and our budget for 1938 contemplates an increase in horsepower connected over that taken on during 1937.—*N. B. Hinson, chief engineer.*

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Tucson G., E. L. & P.

Following is a resume of Tucson Gas, Electric Light & Power Co. activities in 1937 and outlook for 1938.

Constructed during late 1936 and early 1937 was a 6,250-kva. high-pressure steam turbine, which was placed in operation in May, 1937. No generating installations are planned for 1938.

During 1937, 4.3 mi. of sub-transmission line, 13.2 kv., were built. Five miles are estimated as this year's work. Many triple-shot fuses were installed last year.

Added in 1937 were 35 mi. of 2,400-volt distribution, and 1938 is expected to be the same. Two 48-kva. feeder regulators were installed in 1937, with six 24-kva. and two 48-kva. scheduled for 1938. Small condenser banks totalled 1,110 kva. in 1937, while this year's additions probably will be 400 kva.

Capacity added during 1937 was 1,454 kva. Proposed for 1938 is 550 kva.

Capital expenditure for 1937 approximated $553,000. Estimated for 1938 is $286,000.—*M. A. Pooler, vice-president and general manager.*

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Washington Water Power

During 1937, the Washington Water Power Company completed a construction program involving expenditure of $2,115,000, the major part spent on transmission and distribution.

A 110-kv. line was constructed from the Chelan power station to the Howe Sound Mining Co. substation, located at Holden on Railroad Creek, where a 5,000-kw. mining load will be served. This line is 53 mi. and follows along the east shores of Lake Chelan for about 22 mi. A lake crossing with a span of 4,600 ft. is one of its features.

Fifty miles of 60-kv. line were built between Moscow and Orofino, Idaho. A total of 35 mi. of transmission lines were rebuilt throughout the territory.

Approximately 43 mi. of 13-kv. distribution lines were constructed and 33 mi. rebuilt. Farmer-owned distribution lines totalling 125 mi. were connected to the system, transformers and meters being furnished and owned by the company.

Distribution systems in seven cities and towns were rebuilt and substation capacities were increased in eight.

Telemetering equipment for load control in the tie line with Puget Sound Power & Light was installed.

On account of the increased improvement in business in the past two years, which in turn required an increase in personnel, it became necessary to completely remodel and enlarge the general office building in Spokane.

Approximately $1,000,000 has been budgeted for the 1938 general construction. Program involves revamping switching equipment in Little Falls generating station, rebuilding 9 mi. of 60-kv. line between the Post Falls Plant and Spokane, installation of a 100 amp. step-type voltage regulator at Latah Junction, and increasing substation capacities in Spokane Valley and at Juliaetta, Idaho.

Distribution sytems in eight towns and cities are to be rebuilt. There will also be approximately 43 mi. of 13-kv. line reconstructed between various towns to enhance service. On account of the load growth in the downtown area in Spokane, an additional transformer vault will be constructed—*J. E. Royer, vice-president and general manager.*

MORE SALES IN '38

CHARTING YOUR COURSE FOR THE NEW YEAR

WHATEVER your place or position in this electrical industry, the figures on the following pages influence your activities and your life. Look at them, then, with an eye to their significance to your business, your opportunities, your job, your relations with others in the industry. They point the way to tomorrow by showing the course of the immediate past, The sales goals sets for the year 1938 are modest, but by seeing the directions they take, your own course may be better plotted. For instance—

As Manufacturers— Few alert manufacturers need to be told the value of market statistics. They are hungry for information that will give them a look ahead into what their business opportunities may be for the future. Figures tell them where the most active promotion is to be expected and when. The saturation figures tell them the capacity of the market to absorb new merchandise. Replacement percentages show how fast this phase of their business opportunity is opening up. Activity in the field can be better organized, advertising programmed, distribution made more efficient—all vital considerations in this age of narrower profit margins because of increased costs and wages.

As Dealers— Against the total sales reported last year by the utility you can measure your own achievement. By noting the quotas for this year you can gage the amount of effort the utilities will make to stimulate sales through advertising and promotion and that you can expect and count on. With these figures you can better decide what stocks to order, when to plan deliveries to fit in with seasonal drives or campaigns, what dealer help material to arrange, what salesmen's training to schedule so that you can take the best advantage of your chances.

As Wholesalers or Distributors— Valuable indices of markets and market opportunities for 1938 will be found in these statistics. Your own achievement for the past year can be measured against the totals and such knowledge serves to strengthen weak points in the company's program. Better timing of stocks for the trade will come from study of campaigns. Field salesmen can get more business for the house by arranging calls and dealer helps to prepare the dealer for sales opportunities. More profitable operation comes from intelligent planning based on as many facts as can be ascertained.

As Contractors— It may take a leap of the imagination for contractors to see their personal interest in these figures, yet every range carries with it the potential need for wiring, every commercial lighting kilowatt represents a wiring job, the I.E.S. lamp sales are hastening the day for the rewiring of the home. The volume of appliance sales gives an indication of the increasing public demand for electrification and can be used in talking up more adequate wiring installations. The quotas given indicate what push is to be given to electric sales by the utility and from this the contractor can gain an idea of how active his business may be in 1938.

As Anyone in the industry—No matter in what capacity, you can get a quick, authoritative view of the industry's accomplishment. This cannot but generate respect for the consistent, constructive way in which the benefits of electricity are being distributed to the public by this industry, despite the ignorant, partisan outside criticism. Stability of jobs and of income are reflected in volume of sales, for they are closely inter-connected. There is value to everyone in a study of these facts and figures.

Highlights of '37

What Was Done to Build More Load

B. C. Electric Railway

Short sales campaigns have been discarded in favor of continuous, all-year campaigns under the dealer cooperative plan. In connection with this procedure, free wiring was extended on all sales made by company or dealer; $25 trade-in allowance was made by company or dealer when an old range was turned in on a new one; dealers were given a bonus on direct sales of ranges and on all water heater prospects or orders turned over to the company; customers who purchased a range from a dealer received the same concessions as if they had patronized the company directly; the company maintained a 3-step promotional rate as well as a special 8-mill off-peak rate for water heaters.

Aided by two new applications—on the ventilating and heating of laying houses and on hop dryers—the agricultural load developed in 1937 aggregated $30,000 in annual revenue. Plans for this year call for $34,000 in additional revenue.

Largest 1937 installations were made for Canada Packers, 700 hp.; Fraser Valley Tie, Ltd., 350 hp., and No. 3 grain elevator, 600 additional hp.

In spite of a falling off in the lumber industry, higher freight rates and smaller grain crop, British Columbia looks to a prosperous year in 1938. New construction in 1937 showed a considerable advance over the previous year, approximately 1,900 new homes having been built on the lower mainland, and it is expected that the pace will be continued.—*W. C. Mainwaring, general sales manager.*

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California Oregon Power Mountain States Power

Most interesting achievement in 1937 was the development by Glenn Jackson, vice-president in charge of sales for California Oregon Power Co., of a kitchen heater. Used as an aid in providing warmth in kitchens which formerly depended on coal or wood cooking stoves for winter heating, the new appliance is exchanged for an old stove in place of a trade-in allowance. The unit matches the electric range but cannot be used for cooking.

In other merchandising activities the companies set a goal of 80 per cent range saturation as possible of attainment on their lines. And although they carried on no domestic lamp bulb sales, they cooperated with dealers featuring higher wattage lamps by giving away free with every portable lamp sold by retailers the necessary bulbs.

Photo by Santa Fe Ry.

Three hand-clasps signify the arrival in southern California of a 51-car trainload of Hotpoint refrigerators and matched appliances. Forty-five cars were given over to refrigerators, six to smaller appliances; virtually all units were shipped on consignment. Left to right are: H. D. Conklin, Los Angeles district manager, Edison General Electric Appliance Co.; railroad engineer; Mayor C. T. Johnson, San Bernardino; F. C. Todt, Los Angeles district manager, G. E. Supply Corp; trainman, and J. R. Ryan, Los Angeles district appliance sales manager.

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City of Alameda

Citizens of Alameda, Calif., last year helped the city's Bureau of Electricity set several new records. In general they bought more appliances than in 1936. On Jan. 11 their demand for 7,200 kw. of electricity threw the department's previous record into the discard.

In return for this patronage the bureau announced in March a reduction in rates to the tune of $74,000 annually.

Ranges and water heaters were specially promoted by the utility during the year. Three-day cooking schools were held in the spring and fall and the bureau gave and installed seven ranges in local public schools.

Free-wiring was offered on range and water heater installations. A ten per cent of list price allowance was made on trade-ins. Dealers received an $8 bonus on range sales, $5 bonus on water heater sales.—*H. A. Lewicki, sales manager.*

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City of Glendale

Public Service Dept. of the City of Glendale, Calif., last year plugged the sale of ranges and water heaters and succeeded in attaining a total company-dealer sale of 751 ranges, 89 heaters. Free-wiring was one of the principal talking points; otherwise, the utility allowed no extra concessions.

Major events of the year included a weekly cooking school and three or four large shows and demonstrations in local theaters.—*P. Diederich, superintendent of water, light and power service.*

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City of Seattle

Special stress was laid on water heating. To build up this market the city gave away free with each electric range purchase a 4-kw. circulation type water heater, or, if the customer had a range, the same heater was wired and plumbed for $23. This policy of a free heater—as well as a $10 range wiring offer—was also extended to dealers, and a ¾c per. kw.-hr. promotional rate was put into effect on hot water tanks.

Ranges received almost equal consideration from the city. In addition to the wiring offer, purchasers were allowed a trade-in value on old ranges of from $15 to $25. A special price was made when two featured range models were wired and installed.

All in all the year was one of the best to date. Although there was an appreciable slump in business toward the close, things are expected to pick up in 1938.—*Phil Spowart, sales manager.*

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City of Tacoma

Four-unit, cabinet-style ranges priced at $94.50 were featured last year by the Department of Public Utilities, City of Tacoma, Wash., with good results. Sales for department only rose from 551 in 1936 to 600, and quota for 1938 is set at 1,000.

Small allowances are made on trade-ins of ranges and water heaters. There is no free-wiring policy, but the department finances new wiring jobs on contract at no charge for interest.—*A. Anderson, sales department.*

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Coast Counties

Premium plan carried on in 1936 by Coast Counties Gas & Electric Co. with marked success was repeated last yera in modified form. Major difference was this: Instead of issuing premiums based on electric use and good for the purchase of electrical equipment at any dealer store, the company offered free electric service proportional to the bill of the preceding month. This was turned into a merchandising asset by advertising a month's free use with appliances purchased.

The company also maintained a consistent lighting and agricultural program.—*H. W. Edmond, sales manager.*

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Idaho Power

Last year the company made an enviable merchandising record and succeeded in raising the average annual consumption per residence customer to 1,520 kw.-hr. But prospects for 1938 are not so optimistic. Farm prices are low and general business conditions are not expected to be good until October or November.

Taken as a whole the sales success was the result of a number of strenuous campaigns and not of any general innovations in the field. No free wiring offer was made; the fullest possible cooperation was given all dealers; promotional rates, in effect for about the last ten years, were maintained, and, except for a special range trade-in event in February and March, all trade-ins were based on reasonable re-sale value. —*R. E. Gale, commercial manager.*

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Los Angeles Bureau

No merchandiser itself, the Los Angeles Bureau of Power & Light nevertheless contributed to the dealers' $11,700,000 electrical appliance business by conducting in 1937 several range and water heater campaigns, sponsoring innumerable cooking schools and maintaining an 800-ft. range and water heater display at the Food Show.

The campaigns were notable for the offers made. From March 22 to June 1 the bureau conducted a range campaign bearing the theme "$2.75 per Month." This was followed by a combination offer of a 40-gal. water heater and $140 range at "$4.98 per Month." The fall range campaign, sloganed "Receive a $13.75 Wearever Aluminum-ware Set in Exchange for Your Old Cooking Equipment," was responsible for a large number of sales and helped to maintain list price sales. The closing six-week drive on water heaters was developed principally to educate the industry and general public in the economy and safety of the electric heater.

Range and water heater sales were further helped by the department's policy on these appliances. The Bureau offers a special water heating rate of .7c per kw.-hr. for approved two-element heaters separately metered and with time-control over peak hours; inspects ranges on its special test platform; maintains a sales organization which cooperates with dealers, and provides free wiring for approved units either on a contract or contribution basis. Because merchandising is done by the dealers through the EHFA, of which the utility is agent, trade-in allowances, if any, are up to the dealer.

Creation of a sound market for the sale of ranges and water heaters was also a bureau accomplishment. This was the result of the bureau's cooperation with 200 electric appliance retailers in establishing a maximum trade-in allowance on old equipment.

Domestic rates were reduced during the year by shortening the second block from 75 to 65 kw.-hr. and changing the rate from 2.3c to 2.2c. The special water heating rate was also reduced from .75c to .7c per kw.-hr.

What the Los Angeles appliance market will be like in 1938 is not known at present. The field, however, is being carefully studied by the bureau through the medium of an extensive market analysis survey.—*A. W. Elliott, business agent's division.*

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Montana Power

Although industrial and mining operations occupy the preferred position in its thoughts, Montana Power Co. devotes a large part of its time to merchandising activities. Its policy on range and water heater sales is 100 per cent cooperation with the dealers in the territory. No free-wiring or promotional rates are offered, but an allowance of 10 per cent is given on trade-ins.

In comparison with its 6,500-kw. increase in industrial load and 5,200-kw. increase in mining load, the company's 1937 agricultural load development lagged. Only 362 kw. were added.—*I. L. Comstock, assistant to vice-president.*

Floodlighting sells gasoline at the Civic Center service station in Spokane and adds to Washington Water Power Co.'s load. Total output of the five incandescent lamps and three mercury vapor lamps mounted on standards along two sides of the station is 203,000 lumens

Here They Sell More Appliances

Flowers denote the opening of Washington Water Power's new display floor in its Spokane office building. On the right is the customers' service department; in the distance, the cashier's department. At extreme left is the model living room, step-saving kitchen and the laundry room; in the left foreground, the repair and lamp counter

Northwestern Electric

Northwestern's merchandising record stands and falls by the activities of dealers in its territory. With the exception of water heaters, the company does not merchandise and therefore does not conduct any special campaigns. Instead it concentrates on the assistance it may offer the dealers and on its 8-mill off-peak water heating promotional rate.

Lighting activities are conducted on a somewhat similar basis, the solicitation of all customers being year-round and continuous.

Late in the year rates were reduced by discontinuing the demand rate and placing all domestic customers on the same block rate.

Outstanding installations were made in the Multnomah Hotel, the Benson Hotel and for the Peninsula Dock and Lumber Co.—*J. C. Plankinton, manager, sales bureau.*

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Pacific Gas and Electric

P. G. & E. last year adopted a new merchandising policy which largely accounted for the $30,000,000 worth of appliances sold. Campaigns on major appliances were conducted under the aegis of the Northern California Electrical Appliance Society. Promotional events and dealer cooperation were left in the hands of the company's district offices, which were thereby able to effect a better understanding between company and dealers.

Ranges and water heaters were specially promoted in two combination drives which resulted in a sale of 2,901 units. Company practices in respect to the sale of these two lines is as follows: A $15 allowance is made for wiring. Trade-ins are made on an appraisal basis with a maximum allowance of $20. Special promotional rates of 1c are offered on water heating. All installing is done by dealers. Wiring and trade-in allowances are available on dealer sales. Company salesmen receive a part commission on dealer sales.

In the agricultural field the company developed 25,000 h.p. additional load. New annual revenue amounted to $325,000. Program for 1938 calls for concentration on dairy power, poultry power and soil heating.

General sales plans for 1938 will stress water heaters and lighting. Range customers will be sold water heaters; small-use customers, increased lighting. Company revenue goal is $7,286,000, or $6.33 per dollar of expenditure.—*H. M. Crawford, general sales manager.*

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Pacific Power & Light

Pacific Power & Light Co.'s gain in merchandising activities last year was not stupendous, but unlike the case of most other companies the gains were registered in nearly every line of appliances. No small part of this achievement was the result of the wide variety and number of campaigns; while the large increase in radio sales undoubtedly went back to the company's radio show, held in conjunction with 90 dealers Sept. 27-Oct. 16 for the benefit of 30,900 persons in 14 communities.

Southern California Edison Co. presents an action display of electric pumps at the Los Angeles County Fair, Pomona

Range and water heater sales showed a slight advance as the result of the advertising campaigns carried on by the company in cooperation with dealers and the promotional nature of all rates offered. There was no free-wiring plan and no special trade-in allowances were made.

Rates on all residential kw.-hr. consumption in excess of 150 per month were reduced from 3c to 2c, and the rate area was broadened to give small communities the advantage of the lower charge.

The agricultural picture in 1937 showed the development of $19,619 e.a.r. through the sale of 1,465 pieces of farm equipment. Expected in 1938 is a total of $19,319 in added farm revenue.—*D. B. Leonard, commercial manager.*

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Portland G. E.

Trade-in allowance given by Portland General Electric Co. on ranges and water heaters is based on standard appraisal values. The company cooperates with dealers in advertising these appliances and offers an 8-mill promotional rate on off-peak water heating.

Domestic rates were reduced in 1937, the initial charge lowered from 5.5c to 5c and the demand feature eliminated.

Four lighting specialists added 1,380 kw.; four home lighting women, 480 kw.

Developed were 1,087 kw. to add to the agricultural load.

What 1938 will bring is dependent largely on labor conditions. At the end

Clean Heat for Bathers

Because of the extensive sales effort put behind them, bathroom heaters have become almost standard equipment in southern California homes. In this electric home the bathroom is warmed by a tall head-to-heel electric heater. In the hall a fan-type heater is recessed in the wall

of 1937 retail business was in a tail spin for all outlets, there was no industrial growth and the company's load curve was declining through the loss of kw.-hr. sales to industries.

Undeterred by this prospect, however, the company has effected several important changes in the sales department. Included is the halving of the outside sales crew, establishment of a dealer contact department which will work with retailers on EHFA financing of appliance sales and closing of the small appliance department of the Portland store.

This latter move is the most radical. Hereafter the company will sell major appliances — ranges, refrigerators, water heaters and space heaters—but the Electric Store space will be remodeled for use by the accounting and sales departments in handling payments for service, complaints, service connections, etc. Display and demonstration space for major appliances will be shifted to the third floor of the building.

No change has been made in the company's appliance-selling set-up in districts outside Portland.

In charge of the EHFA financing program is George W. Madison. He will be assisted by George E. Kelley and V. M. McKay.—*A. C. McMicken, general sales manager.*

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Public Service of Colorado

Despite its interest in gas, the Public Service Co. of Colorado last year led electrical dealers in its territory in merchandising activities. The company conducted spring and fall I.E.S. lamp campaigns, participated in the Rocky Mountain Electrical League's Electrical Jubilee Exposition and coordinated its sales efforts with all national programs on refrigeration and household appliances.

Although the actual number of ranges and water heaters sold by the company was small in comparison with that of utilities of similar size, the per cent gains were large. Company policy on selling these appliances permits trade-in allowances but makes no provision for free-wiring—instead, cost of wiring is included in the price of the range.—*G. B. Buck, general commercial manager.*

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Puget Sound Power & Light

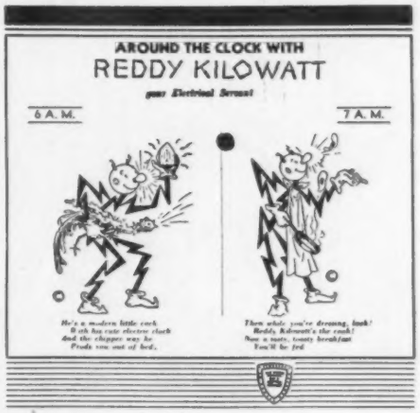
Although sales campaigns formed a definite part of its 1937 program—six company drives were responsible for the sale of 8,517 appliance units; one nine-week company-dealer I.E.S. lamp drive, for the sale of 12,500 lamps—, Puget Sound concentrated to a considerable extent on rural loadbuilding.

Garden by Night

A Denver home-owner succumbs to the picture painted by the Rocky Mountain Electrical League in its garden electrification program and makes of his yard a night beauty spot

These activities netted the company an annual revenue of approximately $63,000, a figure reached not through the sale of merchandise but rather through revenue derived from farm lighting and all other installations outside the farm home.

Most conspicuous among the new uses of rural electrification was the air conditioning of poultry houses. This set-up necessitates the use of an electrically driven fan enclosed in an insulated pipe arrangement in which are two kilowatt heaters operated by a thermostat. Located over a hole in the ceiling of the building, the units baffle air 1⅜ in. from the ceiling so that plenty of temperate air is furnished without draft.



San Diego Consolidated Ad

In line with the practice of previous years the company played an important part in developing for manufacturers, distributors and dealers the sale of electric pumps and running water systems. To carry out this program the company first arranged dealer and distributor meetings; second, advertised extensively in local papers and over the radio, and, third, sponsored irrigation and running-water field demonstrations in ten strategic points in its territory. All this was done in spite of the fact that Puget Sound does not itself directly sell such equipment.

Also in line with previous practice was the display at the Western Washington Fair, Puyallup, of the many different uses of electricity on the farm. This consisted of eleven exhibits ranging from electric greenhouses to home lighting.

In the sale by company and dealers of $3,500,000 of electrical appliances, the company depended largely on its seven campaigns, on cooking, homemaking and lighting schools and on active promotion of dealer sales. There is no free wiring policy, and maximum allowance on trade-ins is $15.—*Patrick Johnson, general sales manager.*

Customers, Consumption and Market

	RESIDENCE CUSTOMERS		FARM CUSTOMERS		AVERAGE RESIDENCE KW.-HR. CONSUMPTION					DOMESTIC RATES	MARKET CONDITIONS		
	1936	1937	1936	1937	1933	1934	1935	1936	1937	Change in 1937	Jan.-June 1937	July-Dec. 1937	1938
B. C. Electric Railway	71,659	73,492	10,772	12,400		1,000	975.2	977.2	991.7	None	Good	Good	Same
City of Alameda	10,058	10,291			740.2	765.6	828.9	820.9	879.4	15-21%			
City of Glendale	21,186	22,310				620		794	914	None			
City of Seattle	79,889	83,000				1,050	1,075	1,125	1,268	None	Good	Reduced	Good
City of Tacoma	33,521	34,114			1,566	1,554	1,563	1,614	1,664	None			
Idaho Power	31,806	38,000	11,664	13,000		1,220	1,276	1,358	1,520	4-8%			Poor
Los Angeles Bureau of Power & Light	203,670*	341,500*			580	588	624	602	780	—			
Montana Power	62,447	63,000	2,270	2,400		705	724	781	820	None			
Northwestern Electric	33,882	34,523	4,161	4,237	1,210	1,200	1,202	1,240	1,308	—			
Pacific Gas & Electric	437,403	450,000	107,797	120,000	733	726	731	791	849	None			
Pacific Power & Light	39,037	41,040	9,736	10,594	1,231	1,236	1,279	1,382	1,475	—			
Portland G. E.	97,060	99,728	8,525	9,046	994	993	1,046	1,160	1,275	—		Poor	
Public Service Co. of Colorado	99,270	104,175	3,886	4,247		498	534	579	620.3	None			
Puget Sound Power & Light	127,543	131,500	25,875	30,200	1,021	993	1,022	1,141	1,236	None			
San Diego Consolidated	67,927*	70,967*			622	753	630	733	835	—			
San Joaquin Light & Power	61,682	82,719	18,425	19,800	912	972	1,020	1,100	1,187	—	Good	Good	Same
Sierra Pacific Power	9,433	10,590*	600		893.2	922	1,005	1,181	1,354	None	Good	Good	Same
Southern California Edison	390,000	410,000	19,500	22,000	681	680	737	801	900	—	Good	Good	Same
Southern Colorado Power	20,535	20,940	1,085	1,350		580	623	682	750				
Utah Power & Light	82,478	83,066	14,418	16,607	705	716	766	876	967	—		Reduced	Reduced
Washington Water Power	55,870	58,817		5,423	1,763	1,610	1,665	1,775	1,875	None			

*Including farm.

How the Utilities Sell Appliances

	DEALERS			1937 CAMPAIGNS AND RESULTANT SALES												SPECIAL EVENTS					DOWN PAYMENT ($)—LENGTH CONTRACTS (MOS.)					
	Handling complete line	Department stores handling complete line	Handling appliances on side	Range	Range sales	Water Heaters	Water Heater Sales	Refrigerator	Refrigerator Sales	Washer-Ironer	Washer-Ironer Sales	Radio	IES Lamp	Lighting	All other	Shows	Exhibits	Homemakers classes, etc.	Trailers	Demonstrations, etc.	Ranges	Water Heaters	Refrigerators	Radios	Washers	Ironers
B. C. Electric Ry.	44	3	50													2	2	2		1	5-36	2.50-74**	5-36	10%-12	5-18***	5-18***
City of Alameda	6															1		2			No-36	No-36	10%-36			
City of Glendale	21	3	5		751*		89*									4		52								
City of Seattle					3,000		2,000		700								1	x		1	10%-36	10%-36	10%-36		10%-24	10%-24
City of Tacoma																				1	8-18	8-18				
Idaho Power	53	22	167	5	3,949*†	4	1,838*†			1	917*		2	1	1		x	x	1		5-20	5-24	10-24		5-12	5-12
L. A. Bureau P. & L.	194	12	87	3		2											1	x			5%-60	5%-60	5%-36	10%-12‡‡	5%-24	5%-36
Montana Power	150	16	60	1	604			1	824					1		1		x			10%-24	10%-24	10%-24		10%-12	10%-12
Northwestern Electric	81	8	635													4		x				10%-36				
P. G. & E.	366	15	794	2		2		1		1		1		1		x	x	x		x	10%-36‡	10%-36‡				
Pacific P. & L.	48	7	414	4	855	4	649	4	732	5	1176		2	3	7	14					10-24	10-24	10-24		10%-12	10%-12
Portland G. E.	93	6	800																		4.50-24	2.50-36	4.50-24		4.50-36††	4.50-36††
Public Service Co., Colo.													1				1				5-36	10%-36	5-36	10%-12	10%-18	10%-18
Puget Sound P. & L.	63	30	407										1		6		1	125†		x	5-24	5-36	5-24			
San Diego Cons.	125	6	75	2	350	2	300			1	250	1			2	2	1				Old-36*	Old-36	10-36		5-18	5-18
San Joaquin L. & P.	65	10	200												1			x		x	7.50-30	7.50-30	7.50-30	5-12	5-18	5-18
Sierra Pacific Pr.	26	7	15															x		3						
Southern Calif. Ed.	498																2	60	20		15%-30#	5%-30#	5%-30#	5%-30#	5%-30#	5%-30#
Southern Colo. Pr.	2	3	30																							
Utah P. & L.	149	22	514	4	3,672†*	3	1,286†*	1	188					3	6	x	x		2		5%-24	5%-24	5%-24		5%-24	5%-24
Washington Water Pr.	39	6	200	7	1,673*	7	1,587*						5		9			x			5%-24	5%-30	10%-24		10%-10	10%-10

*Dealers and company total. †Incomplete. ††Two appliances on one contract. **$5 monthly minimum. ***24 months for washers and ironers on same contract.
‡Maximum $7.50. #Minimum $10. *Dealers' terms on major appliances: 10%-30. ‡‡18 months for values above $100.

Commercial and Industrial Sales

	Commercial Lighting		Industrial Lighting		Domestic Lighting		Air Conditioning Installations			Increased Load (Kw.)						
	1937 added kw.	1938 added kw.	1937 added kw.	1938 added kw.	1937 added kw.	1938 added kw.	Commercial	Industrial	Domestic	1937 Industrial	1938 Industrial	1937 Oil Field	1938 Oil Field	1937 Mining	1938 Mining	
B. C. Electric Ry.	2,860	2,940			450	670	1			7,457	7,077				373	Com. & Ind. lighting combined.
City of Glendale							3									
City of Seattle	428	Same														Com. & Ind. lighting combined.
Idaho Power	1,500										Decr.					
L. A. Bureau P. & L.	2,000						93	7	2	29,900						Load figures combined. Lighting figures combined.
Montana Power							10			6,500				5,240		Air conditioning figures combined.
Northwestern El.	Satis.	Same	Satis.	Same	Satis.	Same	27			3,614	Same					
P. G. & E.					Good		110	11	12	26,150	Same			7,457	Same	Domestic lighting equipment sold valued at $7,000,000.
Pacific P. & L.	1,500	1,240					273	15		x						Lighting figures combined.
Portland G. E.	1,860															Lighting figures combined.
Public Service Co., Colo.							25			4,470				5,960		
Puget Sound P. & L.	3,400						12			x	Incr.					Com. & Ind. lighting combined. Annual revenue added, $140,000.
San Diego Cons.							1			1,296						Ind. load includes agricultural load.
San Joaquin L. & P.	Satis.		Satis.		Satis.		133		46	9,265		7,235		749		
Sierra Pacific Pr.	Good						10									Kw.-hr. sales of Commercial Lighting accounts 20% higher than 1936.
Southern Calif. Ed.	Good	Same					180	25	30	37,250		11,180				Com. & Ind. lighting produced total of $1,200,000 new revenue in 1937.
Utah P. & L.	3,269		468		Good		33	24	510	7,700				6,000	Decr.	
Washington Water Pr.	2,800	2,200			Good	Incr.	12	4	550	3,800				3,600	7,500	

Efforts and Accomplishments of Utility Salesmen

	COMMERCIAL						LIGHTING						INDUSTRIAL						
	Number of salesmen	Customers per salesman	Jobs closed per salesman	Average kw. per job	Average kw. added per salesman	Average number calls per job	Number of salesmen	Customers per salesman	Jobs closed per salesman	Average kw. per job	Average kw. added per salesman	Average number calls per job	Number of salesmen	Customers per salesman	Jobs closed per salesman	Average kw. per job	Average kw. added per salesman	Average number calls per job	
B. C. Electric Ry.	1						8						3						Total number of calls made, 12,376.
City of Seattle	14	5,700					2	5,000	128	1.7	214	1.5							Com. & Ind. figures combined.
City of Tacoma	5	1,000	225	12.5	1,250	3													
Idaho Power	7	1,500			359														Total.
L. A. Bureau P. & L.	50																		Total. Promotional load added, 8,200 kw.
Montana Power	9	1,170					36	1,737											Lighting classified residential.
Northwestern El.	6	400					9	800	139.8	1.4	197.6	10	7	300	48	1,197	24.9	15.9	1936 figures. Includes part-time men.
P. G. & E.	7	15	7				26	3,000	250				12						
Pacific P. & L.	10	750	110	2	220	5	10	750	130	1	130	5	10	50	7	2	10	4	Total of 10 salesmen covers three fields.
Puget Sound P. & L.	6		100	9.2	920		7		180	3.1	560		13	1,740	140	5.2	720	9	Com. figures include com. & ind. power; lighting, com. & ind. lighting; ind., all others.
San Diego Cons.							3	4,000	250	.3	85	8	1	5,000	36	36	1,296	7	
Sierra Pacific Pr.							1												
Southern Calif. Ed.							20	2,750	200	2.3	460	6	51	800			1,700		Industrial listed as Power.
Utah P. & L.	22	510	215	1.58	342								8	345	71	22.2	1,486		Lighting included in general activity.
Washington Water Pr.	14	713											2	327					Commercial salesmen are all-purpose men

Utility-Dealer Sale of Appliances

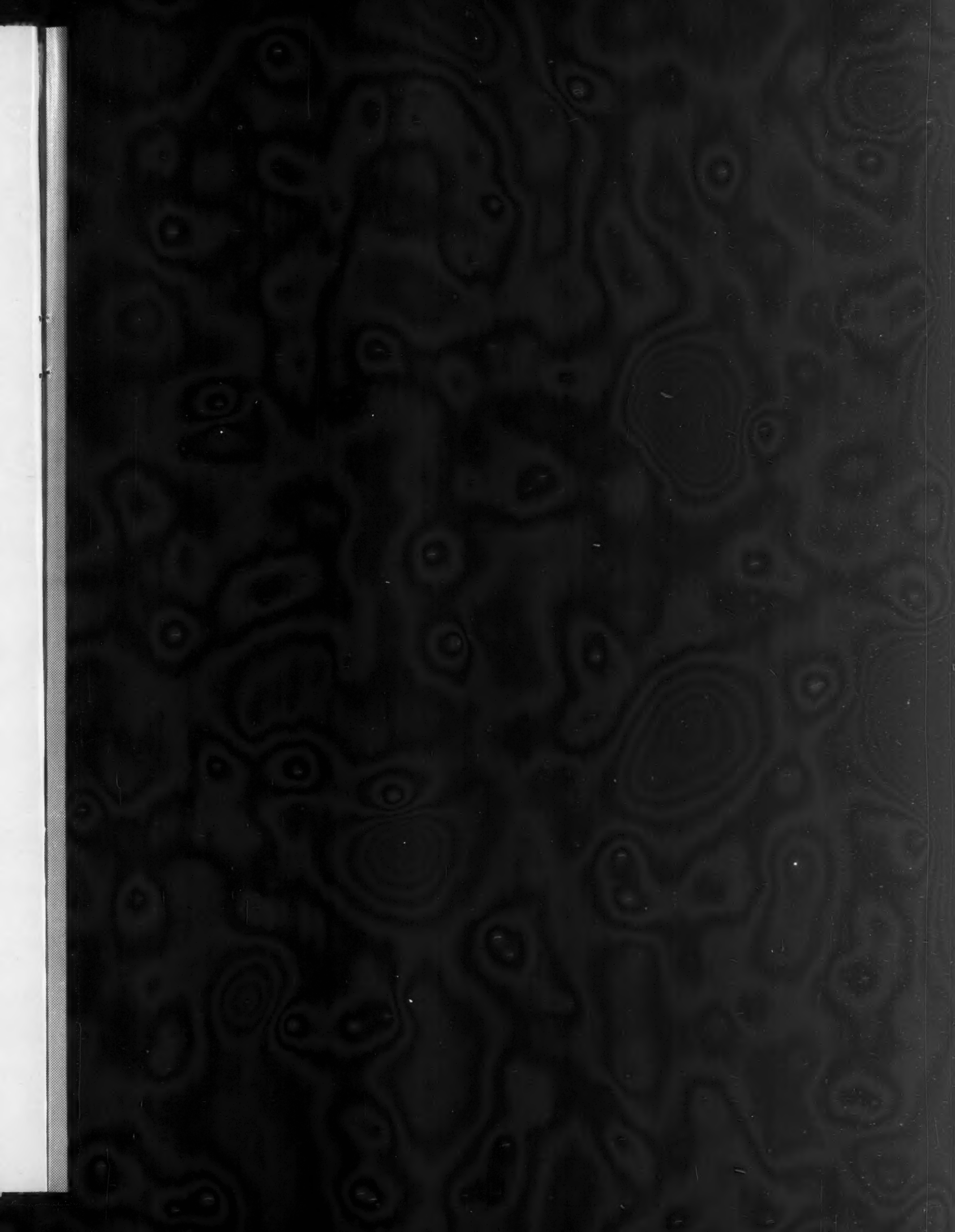
(Estimated Proportion of Replacements—Estimated Saturation)

	Total $ vol. co.-dlr. sales (000)	RANGES					WATER HEATERS					REFRIGERATORS					WASHERS				
		1936 co.-dlr. sales	1937 co.-dlr. sales	1938 co.-dlr. sales	% repl. 1937	% sat. 1937	1936 co.-dlr. sales	1937 co.-dlr. sales	1938 co.-dlr. sales	% repl. 1937	% sat. 1937	1936 co.-dlr. sales	1937 co.-dlr. sales	1938 co.-dlr. sales	% repl. 1937	% sat. 1937	1936 co.-dlr. sales	1937 co.-dlr. sales	1938 co.-dlr. sales	% repl. 1937	% sat. 1937
B. C. Electric Railway	2,250	708	761	815	35	12.8	178	170	125		3.2	1,006	1,964	1,950	2	8.3	779*	3,211	3,000	40	42.8
City of Alameda		360	412	550		14	51	134	175			415‡	388‡	400‡		3	222‡	281‡	300‡		
City of Glendale		363	751				83	89													
City of Seattle	600*			3,500*		40			2,000*		24			700*		30					48
City of Tacoma		551*	600*	1,000*	35	37	184*	225*	500*												
Idaho Power	3,095	4,378	4,563	3,590	36	50.25	2,520	2,288	1,760	25	21	5,865	5,618	5,570	15	45	4,691	3,722	4,190	36	85
Los Angeles Bureau of Power & Light	11,700‡	3,661‡	6,256‡	10,000‡	5	3.4	1,088‡	1,701‡	2,500‡	Nil	.9	38,321‡	36,958‡	38,000‡		48	18,396‡	20,417‡	20,000‡		
Montana Power	620*	1,112	1,179	1,161	25	22	40*	76*	73*	10		7,723	7,074	5,917	10		2,539	3,210	2,707	60	
Northwestern Electric	7,227	1,611	1,590	1,739	25	32.1	297	353	750	5	5.3	3,777	3,288	3,175	15	45	3,604	3,323	3,105	25	63
Pacific Gas & Electric	30,000	4,233	4,324	5,000	8	7.5	2,575	2,538	3,000	1	4.3	47,363	49,083	50,000	10	35	37,137	33,243	40,000	33	50
Pacific Power & Light	3,233	1,591	1,679	1,451	15	20	1,031	1,064	887	15	12.5	6,007	6,789	5,922	10	35	5,965	6,201	5,335	20	65
Portland G. E.	2,500	4,050	3,732	3,600	32	25.4	1,592	1,584	1,550		7.2	8,367	7,661	6,250		40	11,783	10,905	10,085		55
Public Service Co. of Colorado	1,031*	584*	772*		10	1	36*	85*			Nil	2,230*	1,847*		15	45	826*	1,038*		25	55
Puget Sound Power & Light	3,500	5,680	6,310	6,050	31.1	25.2	2,620	2,780	2,850	11.7	11	9,890	11,470	11,200	6.1	27					
San Diego Consolidated	300	720	750	800		6	699	625	500		4	8,785	8,550	8,000		55	4,665	4,400	4,000		60
San Joaquin Light & Power	4,420	2,003	1,737	2,100	8	14	1,051	901	1,050	10	8	10,297	8,939	8,000	30	75	8,566	8,646	5,500		57
Sierra Pacific Power	1,000	817	904‡	700‡	15	50.2	189	281	250	Nil	13.3	1,099‡	1,250‡	1,500‡	5	59.9					
Southern California Edison		6,476	7,305	10,000	5	9	2,914	2,663	4,000	10	4.5	51,534	49,396	45,000	15	60	35,222	34,087	30,000	30	60
Southern Colorado Power	750	363	385		10	20	212	174		3	5	2,266	2,383		8	35	2,131	1,960		10	
Utah Power & Light	6,329	3,574	4,727	4,000	40	33	996	1,636	2,000	10	4	11,198	10,800	10,000	25	50	12,474	10,790	10,020	75	75
Washington Water Power	3,812	2,200	2,151	2,000	32.5	29	1,459	1,828	1,600	20	25	7,540	7,822	7,250	35	44	6,471	6,151	6,800	60	72

*Company only. ‡Dealers only.

	IRONERS					RADIOS					AIR HEATERS					IES LAMPS					OTHER APPLIANCES				
	1936 co.-dlr. sales	1937 co.-dlr. sales	1938 co.-dlr. sales	% repl. 1937	% sat. 1937	1936 co.-dlr. sales	1937 co.-dlr. sales	1938 co.-dlr. sales	% repl. 1937	% sat. 1937	1936 co.-dlr. sales	1937 co.-dlr. sales	1938 co.-dlr. sales	% repl. 1937	% sat. 1937	1936 co.-dlr. sales	1937 co.-dlr. sales	1938 co.-dlr. sales	% repl. 1937	% sat. 1937	1936 co.-dlr. sales	1937 co.-dlr. sales	1938 co.-dlr. sales	% repl. 1937	% sat. 1937
B. C. Electric Railway	251*	382	365		2.7	1,272*	11,148	8,400	80	78.7	404*	523*	545*			3,500	7,500	8,500*							
City of Alameda	100‡	83‡	600‡			590	582				143	324	500*			252	143				242	324			
City of Glendale																									
City of Seattle					10													500							
City of Tacoma																									
Idaho Power	554	430	550		10	6,827‡	8,048‡	6,900‡	50	90	597	866	550		5	6,805	6,171	4,900	14	10	8,097	9,614	9,100	10	
Los Angeles Bureau of Power & Light	3,050‡	3,547‡	3,600‡			23,019‡	28,104‡	30,000‡			1,574‡	2,677‡	4,000‡			10,000‡	20,000‡	25,000‡		10	27,342‡	27,583‡	25,000‡		
Montana Power						6,250‡	6,000‡	5,922‡	85							12,185	7,502	8,881	25		33,584	28,294	34,282		
Northwestern Electric						7,914	7,194	6,255	25	87						7,823	7,051	7,450	Nil		30,906	27,060			
Pacific Gas & Electric	10,441	7,829	15,000		6	103,399	113,544	104,000	66	85	9,485	10,825	10,000	5	2								50,000		
Pacific Power & Light	850	736	680	10	10	8,972	10,614		30	90	641			10		4,662	6,344	5,858	0	17.5					
Portland G. E.	1,510	1,177	1,040		12					87	404*	441*	750*			27,125	27,600	22,500			75,565	75,569	71,200		
Public Service Co of Colorado	276*	236*			6	347*	2,597*		6	80	187*	233*			15	9,518*	4,200*			25	12,142*	13,488*			
Puget Sound Power & Light																20,000	30,000	20,000		16.7					
San Diego Consolidated	1,025	750	1,000		7	13,150	12,500	10,000		75	1,975	2,100	2,500			3,594*	4,329*								
San Joaquin Light & Power	1,681	1,474	1,100		6	12,911	13,360	8,500	75	5	810	847	1,300		14	2,780	3,642	3,000					60,000		
Sierra Pacific Power											111	129‡	100‡				129*				70*	49*			
Southern California Edison	7,026	6,356	4,800		10	61,360	58,342	47,000			2,955	3,670				22,639	22,315				93,102	99,023	100,000		
Southern Colorado Power	130	135		2		1,553	1,642		10							970	1,470		15		13,116	13,600		10	
Utah Power & Light	669	725	646	75	5	19,308	16,634	17,000	70	90	2,217	1,473	2,100	75	5	52,078	47,835	49,000	30	33	95,535	67,997	74,554	50	95
Washington Water Power	689	570	600	50	10	17,256	14,476	13,000	70	92	2,164	1,900	1,800	50	20	11,655	14,475	14,000	70	40					

*Company only. ‡Dealers only.



ELECTRICAL WEST

Appliance Sales Guide

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Why, Where, When, and How to Sell Electric Water Systems

BETTER opportunities to make money by selling electric water systems have never existed for the dealer and salesman. Nationwide publicity to farm electrification has been filling the papers and magazines. The government, even, is circulating publicity as to the benefits of an electric water supply on the farm. The Electric Water System Council, (whose emblem is shown above) has been broadcasting the story of water systems for 5 years, building up the market, the acceptance, the yearning for the service of water under pressure for the farm home. Besides these general reasons for taking advantage of this sales opportunity, there are several specific benefits to the dealer:

Why . . .

1. Sale of a water system carries a good margin for the dealer. 2. It offers your customers the first necessity of any home—a reliable water supply. 3. This sale can lead to follow-up sales of washing machine, water heater, dairy equipment, poultry house equipment, plumbing, bathroom fixtures, dishwashers, and naturally, range and refrigerator. 4. As a source of customer satisfaction, a good water system will create good will for you that will mean more sales to neighbors and friends. 5. Prospects for water systems include more than just the farms in your trading area. 6. Water systems are practically a year-'round item. 7. You need not carry a large stock either to display or sell.

Where . . .

1. Farmers come first in the list of those to whom you can sell a water system. 2. Sell for home use to all farms. 3. For dairies sell a water system to supply the stock, to aid in sanitation and improve the milk grading. 4. Chicken farms need one too for increased egg production. 5. All farms need water under pressure for fire protection. 6. Sell them to summer cabins for vacationists. 7. Road stands and gas stations, away from city water supply. 8. Tourists and auto camps, or farms that take in boarders, summer tourists, vacationists. 9. Amusement parks and picnic groves where parking space is rented, and to trailer camps. 10. Rural schools churches, rest homes, sanitariums, institutions. 11. Even in cities, sometimes, owners of private wells, hotels, small industrial plants requiring special water supply—all of these are prospects.

When . . .

Although Spring, Summer and Fall are best there is really no season to water system selling. Water service is needed the year around. Take advantage, however, of the opportunities offered to enter into mass demonstrations, such as that shown in the photograph below. If the power company or the manufacturers of water systems plan a demonstration of this kind, get in on it. It attracts a lot of attention, brings out people you may never have thought might be interested, shows them the system in actual operation and helps them to decide to buy. County fairs and local celebrations like pioneer days, rodeos, stock shows, when lots of country folk come to town, provide good chances to stage a display and demonstration of water systems.

How . . .

1. Join with other dealers and the utility in a joint demonstration. It sets people to talking and thinking water systems. 2. Write some letters to the farmers you know (See last page of this Guide). This keeps them interested long after the demonstration is over if you haven't sold them there. 3. Invite them to the store, or go out and see them with catalog and information. 4. Check up on what they need in the way of water supply. The manufacturer of your brand of water system has tables that make it easy to estimate this. 5. Go over the list of advantages and reasons for having a water system (see inside pages in this Guide). 6. Smoke out the objections or the resistances by asking questions. 7. Satisfy every one of the objections by piling up advantages to outweigh it. 8. Ask for the order several times. Each time you get turned down you will find out another resistance, and meet it the same way. Then ask again.

. . . When the

When you run into objections—

in presenting the good qualities of an electric water system for a farm or rural store, service station, hotel or tourist camp, listen to the objection patiently. A question or two, after the prospect says, "No", will reveal just what the resistance is. A moment of thought will enable you to classify it into one of the following:

1. **Says he cannot afford it.**
2. **Thinks operating cost is high.**
3. **Is satisfied to get along as he is.**
4. **Fears plumbing cost will be high.**
5. **Doubts ability to run machinery.**
6. **Has a good windmill and tank.**
7. **Is a tenant; doesn't own the farm.**
8. **Believes hard work good for his family.**

In some cases it will be a combination of several of these hold-backs. Sometimes one spoken objection masks several more really vital unmentioned objections. Answering that which is mentioned usually brings out another, and another, until finally the really vital one comes forth.

Successful sales are made only by satisfying the prospect in all particulars that he will be far better off to purchase the water system than to continue without it. As long as any doubt remains the sale is not really "sold".

Even where the first one listed, "he cannot afford it" is literally and genuinely true, the salesman who removes all of the other objections in the prospect's mind will find that prospect seeking him out just as soon as he does have the money with which to buy the water system. For the sake of future sales, the far sighted salesman or dealer will see that each of the above objections are removed if at all possible.

Meet them this way—

Discuss the objection raised by the prospect with him long enough to show him that you really understand and appreciate the difficulty from his point of view. Then you are both sure to be talking about the same thing.

From that point on the objections in turn should be balanced off against the advantages to be gained from the actual use of the electric water system. For instance:

1. **"Can't afford it"** should be overbalanced by the **profit** group of advantages listed in the table on the facing page. (No. 3, 4, or 5). With these mention health and personal advantages to having running water in and around the home (No. 1 and 7.)

2. **"Operating cost is high"** impressions yield to the facts as to actual operating cost. This can be calculated from data furnished by the manufacturer of your line of equipment, or from the power company. Be forearmed with such data. Then review several of the benefits of water service to illustrate the "good measure" such a system gives for the money. (No. 1, 2, 3, etc.)

3. **"Satisfied as it is"** usually is the toughest of attitudes to overcome. Fire protection (No. 2) is the strongest card in this hand. Stress its importance and then bring forth all the good points of No. 1, 3, 4, 5, and 7. In other words, give this one everything, for it is bucking habit, the stubbornest of resistances.

4. **"Plumbing"** is usually more of a fear than a reality. Show the prospect that first it is important to have the water pressure system to provide fire protection. (No. 2). One or two taps can be installed first, one in the house, the other near the barn. Then as he has the time and money the additional plumbing facilities can be added.

5. **"Complicated to run"** is usually just a poor excuse. Treat it seriously, though, but show how automatic and attention-free an electric water system is. It requires less attention than a hand pump or any other means of getting water.

6. **"Has a windmill"** scares off timid salesmen, sometimes, but even the best windmill often lacks wind. Electricity is the most reliable source of power for water supply. Balance peace of mind and absolute assurance of water under pressure in case of fire or emergency against the windmill. Then sell the electric system as an auxiliary to the wind.

7. **"Tenant"** farmers will buy if shown the full list of personal and profit advantages, (No. 1, 3, 4, 5 and 7) and are satisfied that they can take along their pumping unit as they would a refrigerator if they move.

8. **"Hard work never hurt anyone"** is another variation of the habit resistance. It is a justification raised against spending. To meet such an obstacle often takes an often repeated review of all of the good points of ownership and use. Increased value of property (No. 6,) fire protection, (No. 2) and better prices for his produce will weigh more than family comfort.

Prospect Says: "NO"

NO. 2B
ELECTRIC WATER SYSTEMS

Tell of these strong reasons for buying:

1. **Home**—You will have ample water for cooking, drinking, dishwashing, scrubbing, without the backbreak of lugging heavy pails or tiresome hand pumping. Do you realize that you probably use about 35 gallons of water per day per person, and 20 more per person on wash-days—37 tons of water a year for a family of five? You will lengthen your life, save your family's health, and contribute to its happiness. You can have sanitary toilet facilities. Baths will no longer need to be a week end luxury only. Water will be available in time of sickness or emergencies. When company visits you can take pride in being up to date and entertain your guests as well as you could in the city.

2. **Fire**—Away from city fire engines and water mains fires in the country are more serious than ever. Usually they result in total loss. Underwriters estimate that in rural fires 74 per cent of all property involved is destroyed. It is vital, in controlling fire, to get a stream of water on it in the first few minutes, to keep a small fire from sweeping into a big fire. An electric water system provides water under pressure for such emergencies. Its presence reduces fire insurance ratings.

3. **Profit—Egg** production can be increased by providing chicken runs with plenty of fresh, clean drinking water, for eggs are two-thirds water. Although 100 chickens consume but 2½ gal. per day, plenty of water in easy reach increases egg production to a maximum. **Milk** production is likewise increased by providing cattle plenty of drinking water. Individual drinking cups for cows have increased milk production from 8 to 20 per cent, for milk is 87 per cent water. **Stock** will thrive better and be heavier where they are supplied plenty of water. Healthier cattle, decreased losses from sickness, more certain sales value will come with abundant drinking water for them.

4. **Truck gardens,** berry patches, feed for chickens and animals will grow better with abundant water. Garden truck will keep fresher, grow bigger, sell for a better price when sprinkled or irrigated. Crop yield will be better, quality higher, and will market more easily.

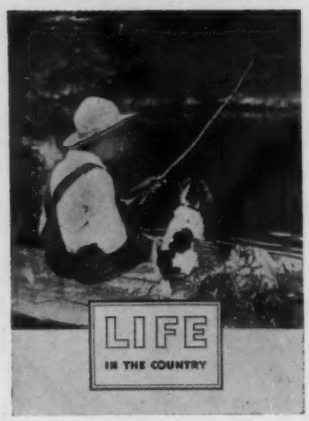
5. **Roadside stands** where you sell your fruits and produce to passing motorists will attract more trade if you have water service too. Produce on display can be kept looking fresher by a fine spray of water occasionally. Spoilage is reduced, and wilting kept down to a minimum. The best kind of trade—repeat customers—will be easier to keep . . . If you offer **tourist accommodations** you will find they rent more easily and for a better price if you supply running water and sanitary facilities. Income for summer boarders or vacationers often depends upon your ability to supply running water.

6. **Property Value**—The entire value of your farm property or rural home will be materially enhanced if it is equipped with water supply. In case you wish to sell, it will bring a better price and find buyers more readily. Renting will be easier and attract better tenants. Insurance rates should be reduced when you provide a source of fire protection. As a first step, a supply of water makes it easier to equip the home with water heater and washing machine, dishwasher and even air conditioning. Well kept lawns and flower gardens add to the appearance and enhance the value of your place.

7. **Sanitation**—Washing of dairy implements, milk cans, even of the cows is easier with a supply of water under pressure and will bring a better rating to your dairy as a source of milk supply. Higher grading of milk means a better market and price. Cleaning around the farm is made easy, instead of back-breaking, with ample water. Milk houses, ice houses, paved floors, walks, vats, troughs, stalls, gutters, and pens can be hosed clean more often, more quickly, kept more sanitary. Besides this, water supply makes possible better bath and inside toilet facilities in the home and gives better protection to family health. Health alone is worth more than the few dollars a water system costs.

PACIFIC POWER & LIGHT CO. • IDAHO POWER CO.
UTAH POWER & LIGHT CO. • WASHINGTON WATER POWER CO.

Dealer Can Personalize His Own Advertising



When you have a good prospect give him a copy of this convincing booklet, prepared by the Electric Water Systems Council. Your electric utility can get you copies

Your Dealer Letterhead
Address
City

Date here, 1938

Mr. N. E. Rancher,
R.F.D. 2, Bx. 38,
Yourtown, State

Dear Mr. Rancher:

I suppose you have often thought about how much better it would be to have running water under pressure at your farm, but have put off looking into it.

There are so many uses for water around a house, and it is so inconvenient to be without it that one of our new _____ (name of brand you carry) Water Systems is the first thing most folks want when they find out what it will do for them. For instance:

You will have ample water for cooking, drinking, dishwashing, without the backbreak of lugging heavy pails or tiresome hand pumping. Do you realize that you probably use about 35 gallons of water per person per day, and 20 more gallons per person on washday? That makes about 37 tons of water a year for a family of five. A lot of lugging!

Why, you will lengthen your life, save your family's health, and contribute to its happiness with a water supply system. You can have sanitary toilet facilities. Baths need no longer be just the week-end luxury. Water will be available in time of sickness or emergencies. When company visits you can take pride in being up to date and you can entertain your guests as well as you could in the city.

Why not drop in next time you are in town and talk it over with me? Maybe we can work out some way for you to start enjoying a real water supply.

Yours sincerely,

(Signed)

Letters—

to your prospects give you the best chance to tell a simple and convincing story. No need to make the letter elaborate, nor difficult. In fact, the letter is half written if you use the 7 sales reasons for a water system that you will find inside this Sales Guide. The letter at the right shows how to use No. 1. Follow it the next week with a second letter, giving point No. 2. A simple way to start the second letter is to begin: "Last week I told you what a water system would mean to you and your family around the home. Now let me say a word to remind you of what an electric water system would mean to you in case of fire."

●

After inserting No. 2 paragraph, lead into the subject of the third letter by saying something like this: "Next week I will tell you a few ways in which water supply can be turned into profit for you. But meanwhile, why not drop in next time you are in town and let me show you the ———— water systems I have on display and explain all about them. I'd enjoy a visit from you."

●

Of course use some of the pamphlets and envelope stuffers that the manufacturer of your make of water system has available. Put one in with your letter. The real force of the letter comes from the fact that it is a personal message from you, in your town, to your neighbor-prospect in your own county. Your personal interest in him is worth double anything in print that you can get already made up. In fact it gives the printed material the authority of your personal endorsement. You will make more sales if you write personal letters like this to your farmer friends. And it is easy to write them in this way.

●

If you run ads in the local newspaper you will be surprised how effective these sales points can be if you let them tell the story for you. With a small cut of the water system that you handle, (which you can get from the manufacturer) run No. 1 point, and then your company name. Next ad, use No. 2 point. Then No. 3, and so on until all 7 have been used in turn. Then repeat. The most effective advertising in magazines is that which repeats the same helpful message over and over continuously. The plan suggested here gives you variety and yet simplicity. It touches the *personal interest* of all possible buyers of a water system in your vicinity.

Other
sources of Sales Help

Since national attention has been turned toward electric water systems and your own utility is vitally interested, a much better choice of sales help material is now available from the maker of your line of electric water system than was true several years ago. Get the factory man or your distributor to show you the display cutouts, the window banners, the pamphlets and envelope stuffers he can get for you.

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At the electric utility office or main office you will find that one or more of the staff has been specializing in electric water systems. Such men can be of great assistance to you in helping to put over a difficult sale. They can also help in figuring out special applications and in meeting special conditions. Be smart and use their special knowledge and experience. Their help to you will mean more sales for you and more electric load for the utility, a mutually profitable cooperation.

San Diego Consolidated

Aside from its active participation in appliance promotion and shows, San Diego Consolidated Gas & Electric Co. went after more business by reducing domestic rates in March and allowing a special inducement in rate form to range and water heater customers.

The general rate reduction, the fourth in two years, allowed consumers a saving of $120,000 annually. The inducement to range and water heater customers was a discount of ½c per kw.-hr. on all consumption on the 1½c block.—*A. E. Holloway, vice-president in charge of sales.*

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San Joaquin Light & Power

Believing that highly specialized campaigns do not contribute to the greatest degree of loadbuilding, San Joaquin Light & Power last year, as in years past, carried on a steady, aggressive cooperative merchandising program with dealers in the territory. Periodic promotional campaigns were, however, on the company's agenda.

These campaigns consisted primarily of promoting seasonal appliances by means of newspaper, bill-board, radio and magazine advertising backed up by store display cards and the personalized window display service offered dealers. Along with these campaigns, demonstrations were conducted in company and dealer retail stores. And, in line with company policy, all sales made in district offices were placed through dealers in rotation or when the customer indicated a preference.

Outstanding in the 1937 drives was the All-Electric Sales Contest conducted in the Fresno territory. In this contest merchandise prizes were given under a point plan to all salesmen for all types of domestic appliances.

That this kind of cooperative selling is successful has been conclusively proved by the increase in kw.-hr. consumption per residence customer. Over a five year period the figure has increased from 912 to 1,187.

Agricultural load developed during 1937 totaled 30,902 kw.; new load, 28,382.

Rate reductions were made on domestic lighting service, in combination with heating, cooking or single-phase domestic power service, both in incorporated and unincorporated areas Feb. 1. These reductions amounted to roughly 11 per cent.

Appliance sale prospects for 1938 are about on a par with 1937 results. Because of the increased number of retail stores, however, individual dealers will be hard-pressed to equal last year's sales.—*H. H. Courtright, president & manager, Valley Electrical Supply Co.*

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Sierra Pacific Power

Inasmuch as the almost negligible number of Sierra Pacific rural customers depend for water on gravity irrigation systems instead of pumps the energy consumed on company lines is largely domestic energy and charged for on that basis. This accounts for the elimination from the records of the farm classification.

It is interesting to note, however, that the average annual consumption for the so-called farm customers as classified in 1936 is approximately the same as the straight residential consumption in suburban territories. The increase in kw.-hr. consumption, therefore, from 1,181 in 1936 to 1,354 in 1937 is a noteworthy accomplishment. If this gain of approximately 15 per cent can be kept up the 1938 goal of 1,500 kw.-hr. should be attained by September or October. This will mean an increase of 50 per cent in three years, for it was in October, 1935, that the 1,000-kw.-hr. mark was passed.

Meanwhile the company continues to sell a large number of appliances. This is the result, not of expensive campaigns, but of a balanced sales program which keeps salesmen happier and is more profitable to the dealers. While it is true that dealers do push refrigerators, for example, heavier in May and June than in other months, it is equally true that a very satisfactory volume of refrigerator sales are reported when the snow is on the ground and temperatures are below freezing.

Dealer encouragement, grounded on the same cooperative policy which has been in effect for five years, produced fine results in 1937 and will be continued in 1938. Under this plan the company extends four distinct contributions to all cooperating dealers: (1) A kilowatt and/or unit bonus on ranges, water heaters, space heaters, refrigerators and air conditioners; (2) a $35 wiring allowance for electric ranges displacing competitive fuels in old residences; (3) advertising cooperation; (4) cooking schools and home demonstration helps.

1938 should be almost par with 1937. Anticipated are a few less range sales because of slackening residential construction and a few more refrigerator sales because of general acceptance and demand for this appliance. Total business, however, will not vary greatly from the fine results of 1937.—*F. G. Hodge, sales manager.*

Typical window display prepared and arranged for a dealer's store by the display advertising department of San Joaquin Light & Power Co.

Better Light—Safer Life

Sodium lighting on the new Pattullo bridge over the Fraser River at New Westminster near Vancouver, B. C., brightens the night. The largest in Canada, the installation consists of 62 sodium vapor lamps of 10,000 lumens each

Southern California Edison

Active merchandising by Southern California Edison Co. went by the boards several years ago. In 1937, therefore, as in previous years, the company confined itself to dealer promotion programs and continuous pushing of appliances.

The promotion took the form of extensive media advertising, special appliance and home lighting exhibits at the San Bernardino Orange Show and at the Pomona Fair, an average of more than one major theater cooking school per week and use in the field of twenty trailers, repairing appliances and selling home lighting.

Further assistance was given by a free wiring policy on ranges and water heaters and the placement through dealers of most sales. On its own few range and water heater sales the company makes a trade-in allowance.

Rate reduction effected in certain portions of the company's territory in 1937 amounted to a saving to customers of $498,000 annually.

On the agricultural side of the ledger the company developed a new load of 30,000 hp. 1938 plans call for similar development.—*W. L. Frost, vice-president.*

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Southern Colorado Power

Southern Colorado Power Co.'s merchandising score for 1937 showed a five to three victory over 1936. Sales of five appliance lines increased, sales of three decreased. None of the changes in results was very great, however. Largest was in the I.E.S. lamp division, where the company registered 500 more sales than in 1936.

Southern California Edison Ad

Average annual consumption per residence customer continued a steady march upward, the 1937 figure of 750 kw.-hr. being 170 higher than four years ago.—*G. W. Milliken, vice-president in charge of sales.*

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Utah Power & Light

Winner of the George Hughes award for electric range selling and equally successful in the sale of other appliances, Utah Power & Light Co. can attribute a large measure of its success to the cooperation given dealers.

For instance, all company outside residential salesmen are paid on an e.a.r. basis for sales made for the company. In making sales for dealers they are allowed the same e.a.r. credit.

In range and water heater activities the company offered, as promotional rates, half price on all electricity used in excess of the previous year's billing and an objective rate. Water heaters were installed for $5.

Straight residential lighting rates were reduced in April by 1c per kw.-hr.

Agricultural load developed in 1937 totaled 877 kw. New applications included soil heating cable for water trough warming and electric pig brooders. 1938 plans call for continued development on approximately the same basis.

Principal industrial installations were made for the San Juan Metals Corp., 800 hp., and for the American Smelting & Refining Co., 1000 hp.

Prospects for 1938 are dim in comparison with those for 1937. Anticipated are reduced sales and reduced pace in the expansion of the mining industry.—*W. A. Huckins, sales manager.*

●

Washington Water Power

Outstanding feat of Washington Water Power Co. in 1937 was the raising of its already very high domestic kw.-hr. consumption figure another 100 points. This new high—1,875 kw.-hr.—was attained in spite of the fact that the company is rather far down the line in range and water heater saturation and depends only on trade-ins to stimulate interest in customers.

What the kw.-hr. consumption figure will be in 1938 is problematical. Suffice to say that the company will use special sales crews to sell unsold customers (those using 300 kw.-hr. per year or less) and low-bill customers more ap-

The World Is a Scene of Changes

To keep pace with its progressive, up-to-the-minute merchandising policy, British Columbia Electric Railway Co. modernizes and simplifies its large show room on Granville St., Vancouver. Gone was the old cluttered-up appearance (left) when remodeled store (right) was opened to the public

pliances and will stress more and better dealer outlets, the active promotion of ranges and water heaters and a light conditioning program.

In 1937 the merchandising drive was materially aided by the Kitchen Modernizing Bureau. This organization planned approximately 500 kitchens, most of which are now being installed by customers. In addition the company participated in the National Kitchen Planning Contest which drew 250 local entries.

Largest installations made in the industrial field in 1937 were for Spokane Portland Cement Co., 400 kw.; Star Mill-Sullivan Mining Co., 1,300 kw., and Highland Surprise Mine, 400 kw. Anticipated for 1938 is a 7,500 kva. additional load derived from the Sullivan Mining Co. and the Howe-Sound Mining Co.—*Lewis A. Lewis, assistant general manager.*

●

Development League

Primary objective of the Electrical Development League of Southern California, established two years ago and growing ever since, is to provide a hub around which the entire electrical industry can revolve. Last year the objective bore fruit. Five points of attack indicate even greater success in 1938.

These points are: adequate wiring, dealer education, maintenance engineers' association, electrical exposition and salesmen's school.

Adequate wiring remains as the greatest over-all problem confronting the industry and will be emphasized accordingly. The Department of Adequate Wiring Design, organized in August, 1937, will be enlarged by the addition of more men. These men, trained to offer technical advice as well as render promotional service, will concentrate their activities among architects, contractors and home builders. In addition they will carry their work into the industrial and commercial fields.

Dealer education classes, started late last year, will be continued on an advanced scale. Additional man-power will be provided to instruct in any phase of dealer activity where difficulties which cannot be solved by the conference method arise.

The Electrical Maintenance Engineers' Association, a league subsidiary, will work under a three-point program. (1) In an effort to keep its members informed as to latest developments, special forums will be arranged to discuss controls, instruments, relays, lubrication, trouble-shooting and electronic tubes. Each course will consist of six weekly meetings of two hours each. (2) Through the offices of the league an employment service will be rendered members. (3) Apprentice training.

Characteristic of Reno retail establishments is Howell Electric, Inc., General Electric dealer. Utility-dealer program in effect in that territory has built up strong electrical outlets

The Electrical Age Exposition, held as a part of the Southern California Home Show, April 21-May 1, will be specially promoted.

Electrical appliance salesmen's schools will be formed, as a later development of the dealer education program, to provide southern California electrical retailers with the highest type salesmen available.

Ground work for all this activity was laid in 1937. Other accomplishments included sponsorship in cooperation with the Producers' Council Club of Southern California of a dinner-meeting at which 225 architects were told the story of adequate wiring, kitchen planning and better lighting; promotion of the Modern Store Display held last month; assisting the local committee of the N.E.C.A. with the administrative detail attendant to the national convention; affiliation with the International Association of Electrical Leagues; sponsorship of an "All-Industry" Rally; cooperating with the Western Institute of Light and Vision in two lighting forums; promotion of a closer relationship throughout the industry by meetings of league committees and trustees, and general advertising.—*F. L. Hockensmith, general ganager.*

Pacific Power & Light Co. decides that men deserve a break. In its show-room window, therefore, it displays a full line of electrically driven home work-shop tools

●

Electric Appliance Society

Campaigns of the Electric Appliance Society of Northern California are the result of spontaneous combustion, more than long time planning. A product group, usually of wholesalers, distributors and their retail outlets, sits down together and arranges for a promotional campaign. The society carries it out along the lines such a group determines. The utility, Pacific Gas and Electric Co., participates chiefly through underwriting the advertising part of the society promotion, holding floor displays and demonstrations of the featured appliance and conducting local contests among dealer salesmen to stimulate exceptional sales effort.

During 1937 four such campaigns were held. First was a refrigerator drive, in April and May, sloganed "It pays for itself, then pays you, the thrifty electric refrigerator." Sales stepped up to 5,914 units in April as a result, and continued on a high level all year. Next came an ironer campaign in September, under the slogan, "Take the irk from laundry work with a new electric ironer," and offering a $5 certificate applicable on any ironer of over $69.50. Ironers had been selling at a rate of about 400 a month; stepped up to double that, continued to feel the effects of the campaign on through Christmas.

A radio campaign in October, under the slogan, "You're there in person with 1938 high fidelity radio," made a concession to the rule against home demonstrations in order to allow comparisons in the home which would close more sales. Radio sales, which had been running around 6,000 a month, immediately stepped up to 8,400, then to 13,600 in November, 10,400 in Decem-

Largest Between Coast and River

A 3.4-mi. stretch of highway between Salt Lake City and Murray, Utah, boasts the largest installation of sodium lighting between the Pacific Coast and the Mississippi River. Installation consists of ninety-six 10,000 lumen sodium-vapor lamps of approximately 200 watts per lamp

ber. Small appliances were given the stimulation of a campaign in December. This had as its slogan, "The answer to Christmas hinting and hunting —electrical gifts."

Since no dealer reports on small appliances are tabulated there is no statistical record of the effects of the campaign. Its general reaction in the dealer trade, however, was excellent.

In each campaign the society issues two large ads to from 200 to 250 daily and weekly newspapers in northern California, supplies these papers with clip sheets and mats and furnishes all dealers with display cards using the campaign slogan. P. G. & E. supports the campaign with bill stickers, truck banners, a contest in *P. G. & E. Progress*, radio announcements and floor displays and demonstrations. Individual campaigns have various special features consistent with the appliances being stressed.

This year the Outdoor Christmas tree campaign in northern California was also handled through the society. Exceptionally fine response to this program came from virtually all communities.

In 1938 much the same kind of activity is contemplated. There is no predicting at this time just what drives the trade will want and the society conduct. The first will be a refrigerator campaign. What others develop will depend on spontaneous demand.—*Bert Reynolds, promotional director.*

●

R.M.E.L.

Promotion, expansion and general usefulness are the general headings under which the Rocky Mountain Electrical League's 1937 and 1938 activities fall. A random glance at last year shows the following accomplishments:

The League obtained a total of $28,760 worth of free publicity as a result of various sales efforts. Conducted a $500 contest which evoked 3,233 replies and proved that people in the Rocky Mountain region want refrigerators, I.E.S. lamps and radios—in the order named—more than any other electrical devices. Promoted 67 Christmas lighting contests and an I.E.S. lamp, Better Light—Better Sight campaign. Formed thirteen local electrical leagues.

Conducted a "June Bride Gift Month" campaign. Reached 2,000,000 persons with "Give Something Electrical for Christmas" and other sales messages. Promoted a window and store-front lighting exhibit which led to several jobs; installation among utilities of seven all-electric kitchen displays; street-lighting installations for Christmas. Obtained cooperation of school officials in raising standard of classroom lighting. Sponsored a series of contractor-adequate wiring meetings.

Encouraged by the success of this work, the league last month launched another membership campaign and voted an increase in dues. Other incomplete plans call for publication of a directory (on the press January 15) covering the electrical industry of the region, sponsorship of several I.E.S. lamp drives and exploitation of the $350,000 kitchen equipment drive of the Modern Kitchen Bureau.—*George Lewis, managing director.*

●

San Diego Bureau

Despite the losses, ranging from 2 to 15 per cent, shown in the sale of four major appliances and a business letdown which dropped sales figures for the last six months of 1937 below the 1936 level, appliance sales as recorded by the San Diego County Bureau of Radio & Electrical Appliances were generally higher last year than in 1936.

Losses were felt in the refrigerator, water heater, washer and ironer lines, but the remaining fourteen appliances handled by bureau members increased in sales. Especially strong gains were made by food mixers, coffee makers, roasters, toasters, electric irons, sewing machines and ranges.

Active promotion was largely responsible for this record. Starting in February the Bureau sponsored in order a "Coming Out Party for Table Appliances," a one-month automatic ironer campaign, a Spring Fair of Household Appliances, an extensive refrigeration advertising campaign, a "Two Radios for the Price of One" drive and the Fifth Annual Electric Show. Newspaper, radio, car-card and outdoor advertising were used in pushing the drives.

In addition to these merchandising activities the bureau formed a strong Committee on Radio Interference, which, after several unsuccessful hearings, managed to push through a radio interference ordinance effective as of July 1.

Looking at the appliance sales picture for 1938, one is confronted by the general belief that the first few months of the year are hopeless. Taken as a whole, however, the prospects for San Diego County are optimistic.

With increased naval and military payrolls, a variety of staple industries and a large tourist influx to fall back on, San Diegans can expect, without much fear of contradiction, that 1938 merchandising results will carry to levels closely approaching the 1937 averages. Certain it is that the bureau plans still more complete and aggressive promotion campaigns.—*J. Clark Chamberlain, secretary-manager.*

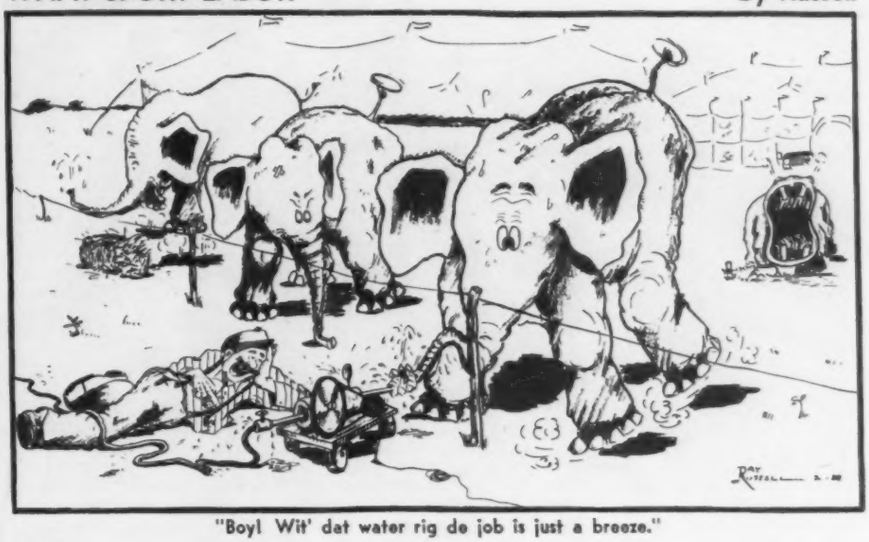
Sales Shorts

Cooperative Wall Lamp Drive

Sale of 2,500 indirect portable wall-lamps during January and February is the announced objective of a campaign launched by the B. C. Electric Railway Co. in conjunction with electrical contractors and dealers on the Canadian Pacific Coast. The undertaking marks the first occasion on which the cooperative merchandising idea, heretofore confined to major appliances, has been applied to a low-priced line.

Three models of lamps selected for the drive are priced at $4.95. Permitted is a down payment of 45c, the balance to be paid in monthly installments on the light bills of B. C. Electric customers. Financing is handled by the central station, which delivers the unit and pays the dealer a bonus of 75c for each order taken. Display units for windows and counters are furnished the trade by the central station and extensive advertising is being employed to boost sales.

WHAT SPORT LABOR —by Russell



"Boy! Wit' dat water rig de job is just a breeze."

SIXTY-FOUR TRANSCRIPTIONS entitled "Adventures of Reddy Kilowatt" are being prepared for Utah Power & Light for use over radio stations in its service area. The transcriptions are one minute in length.

UTAH POWER & LIGHT CO. has finished the last of a series of five cooking classes, held under the direction of Miss Evelyn Hansen, Provo home service supervisor, for home economics teachers in Provo schools.

APPLIANCE SALES REPORT

A Summary of Dealer and Utility Reports Compiled by Associations, Societies, Bureaus, or Dealer Contact Departments of Utilities

December 1937	L. A. Bureau of P. & Lt.[1]		Idaho Power Co.[2]		P. G. & E. Co.[3]		San Diego Cons. G. & E. Corp.[4]		San Joaquin Lt. & P. Corp.[5]		Southern Calif. Edison Co. Ltd.[6]		Utah Power & Lt. Co.[7]		Wash. Water Power Co.[8]	
	Current	12 Mos.	Current	12 Mos.	†Current	12 Mos.	Current	12 Mos.	‡Current	‡11 Mos.	Current	12 Mos.	‡Current	‡11 Mos.	‡Current	‡11 Mos.
Ranges	427	6,256	258	4,563	267	4,324	90	800	122	1,565	412	6,756	237	4,410	130	2,068
Water Heaters	119	1,701	217	2,288	151	2,538	95	633	73	818	191	2,633	47	1,563	112	1,774
Air Heaters, aux.	444	2,140	170	866	1,824	9,505	350	2,000	132	442	578	3,473	136	1,275	358	1,404
Air Heaters, 220	89	2,677			135	1,320			79	772						
Refrigerators	1,355	36,958	181	5,618	1,954	49,083	500	8,625	132	5,968	1,520	48,851	216	10,433	255	7,552
Dishwashers	13	124		17	15	225			5	40			12	66	10	22
Washers	1,399	20,417	232	3,722	2,439	33,243	350	4,325	344	3,941	2,247	34,082	757	9,806	395	5,707
Ironers	418	3,547	21	432	466	7,829	75	835	76	681	460	5,344	59	614	32	535
Vacuum Cleaners	487	6,528	150	1,387	2,004	30,777	300	2,595	96		1,392	13,938	347	5,475	238	2,721
Radios	3,841	28,104	1,307	8,048	10439	113,544	1,900	12,625	754	6,185	8,438	59,027	1,710	13,946	1,510	12,095
Mixers	811	2,417	456	1,174	517	6,760	700	2,685	74	566	1,802	6,090	114	1,991	139	1,604
Cookers, Casseroles	236	877	58	357			250	1,165	78	1,503	224	1,231	114	1,004	258	3,384
Irons	1,133	7,169	713	5,463			600	6,200	390	3,739	2,414	18,708	865	12,832	814	8,982
Waffle Irons	886	2,611	640	2,043			750	2,675	138	966	2,032	7,180	397	4,261	291	2,041
Toasters			873	2,751			1,000	4,750	175	1,473	2,206	9,453	420	5,978	537	4,731
Table Stoves	717	2,082	295	1,887			200	1,095	114	1,097	878	3,822	418	9,079	114	2,214
Heating Pads	646	1,553	301	916			450	2,110	137	1,022	903	3,578	148	2,324	202	1,465
Curling Irons											114	716	85	3,009		
Coffee Makers	238	1,322	697	2,576			700	4,375	152	1,303	1,251	4,937	344	5,561	675	4,562
Sewing Machines			14	173	852	12,877	125	1,050					107	1,594	57	647
Clocks	808	4,562	517	1,134					222	1,652	2,164	8,260	215	4,070	378	2,963
Fans	21	1,440	10	1,486					5	1,831	89	4,415	21	2,237	36	2,389
Floor Polishers																
Sun Lamps	18	303	21	79							43	452	16	124	1	23
Reflector Lamps			944	3,997					198	1,604			1,375	9,904	2,059	10,879
Miscellaneous Lamps			1,037	5,371					173	1,153			575	9,087	737	7,787
Yard Lights									30	510						
Misc. Small Appl.	526	3,123					2,000	7,075	122	1,486	1,390	8,890				

APPLIANCE

Sources:

[1] Compiled by Los Angeles Bureau of Power and Light for territory served by that system.
[2] Figures compiled by Electric Equipment Sales Association. Include power company sales and sales of all reporting dealers—about 60%.
[3] P. G. & E. reports sales of major appliances only based on accurate reports available from dealers' accounts. Ranges, water heaters and air heaters include company and dealer sales. Total dealers include gas as well as electric dealers.
[4] Gathered by Bureau of Radio and Electric Appliances of San Diego County. Estimated monthly sales figures used in this table: Clocks, fans, included under miscellaneous.
[5] Includes dealer reports from Midland Counties Public Service Corporation also. Compiled by Valley Electrical Supply Company.
[6] Includes reports from dealers on San Joaquin Valley system of company as well as Southern California areas served.
[7] Includes Utah Power & Light Company territory in Utah, Idaho and Wyoming. Also Western Colorado Power Company territory.
[8] Dealer sales only for Spokane and company territory. Company sales not included. Table stoves, grills included with cookers.
† Under current month heading is shown previous month's figure. Lag of one month is also shown in total sales for year to date, which began December, 1936.
‡ December report was not available at time of going to press.

General Electric Lamp Division practices what it preaches. In the San Francisco offices Engineer Leo Gianini installed over the window a built-in trough, with light control lens, to give directional light on his desk (left). In Morris Hixson's office (center) two troughs set at an angle over each window produce, with the aid of general ceiling lighting, intensities of 100 ft. candles. In the general offices (right), shields in the parchment-shaded ceiling units cut visible light from the stenographers' eyes; inset ceiling units along the filing corridor train light downward on the files

Building Jobs

One antenna feeds 519 outlets in Furniture Mart. Installation is largest of its kind

Satisfactory installation of the new RCA Multi-Wave Antennaplex System to provide antenna connections for the hundreds of radio receivers on display in the Western Furniture Mart, San Francisco, has done much to show the way to electrical contractors seeking untouched, profitable sources of business.

The installation, necessitated by the building management's desire to get away from the unsightly maze of wires ordinarily required to serve the radios efficiently, is said to be the largest of its kind in the world. Five hundred and nineteen antenna outlets are located in various parts of the Mart.

The system is dependent on a single antenna assembly erected on the roof above the field of interference-creating electrical disturbances. Separate wires pick up the different radio bands and, through suitable coupling transformers, deliver the picked up signals to an amplifier. After amplification all signals are fed into a special shielded transmission cable which keeps the reception clear and noise free, then into a coordinated distribution system which divides the signals equally among all the outlets.

Since the picked up signal is amplified in an amount greater than the amount dissipated in the transmission lines, the reception at each outlet is greater than that which could be received from an individual antenna.

Advantages of such a system are apparent because it is designed primarily to meet apartment house and hotel requirements.

●

Explosion Proof Hospital

Wasatch Electric Co., Salt Lake City, has been doing an interesting installation at the Latter Day Saints Hospital where a new floor is being added. The new floor will contain six operating rooms with connecting sterilizing rooms, an anaesthetic room, orthopedic and cystoscopic room as well as doctors washup room. On account of the hazards in operating electrical equipment in highly volatile anaesthetic gases, extensive vapor proof and explosion proof fittings and switches are being used. As many as six or seven arc proof convenience outlets are provided in every operating room.

Since the new floor is on the sixth floor of the building, it was necessary to drop the ceiling on the fifth floor. This required the rewiring of that floor and relighting at the same time. Duplexalite hospital units are being installed on the fifth floor.

●

Utah Office-Store

To provide closer contact between company and local dealers and to make payment of bills more convenient to customers, Utah Power & Light Co. has opened a new office-store at 21st South and McClelland Ave., Sugarhouse, Utah.

Of particular interest in the building is the display window, equipped with thirty 200-watt reflector units. Ceiling of the window is constructed in two levels, the lower level being lined with reflectors set at a slant to illuminate merchandise to greater advantage. Background of the window and the window platform is white for maximum light reflection.

Manager of the store is David Watson.

●

AIR CONDITIONED "AUTO MOTELS" are the newest thing in southern California. H. M. Hughes of San Bernardino recently erected a model group of Spanish bungalow houses equipped with Carrier air-conditioning, a circulating ice-water system and kitchen apartment refrigerators. The air conditioning is supplied from a central plant which carries the conditioned air to each bungalow by a duct system.

●

Wiring

Reddy Kilowatt becomes symbol of adequately wired homes

For those companies employing Reddy Kilowatt an idea developed by Oklahoma Gas & Electric Co. and made available through the Reddy Kilowatt Service of Ashton B. Collins holds appropriate interest in the adequate wiring program. Instead of reviving the Red Seal program which it had formerly conducted, the Oklahoma company decided to capitalize on the widespread interest among both adults and children in Reddy Kilowatt.

A plan, embodying a specification, and a chart story to tell it to the trade, was worked out. It was presented to the architects of that region, then the builders and later electrical contractors. It was received enthusiastically and a number of "Reddy Kilowatt Electric Homes" with greatly increased wiring facilities are being opened to the public.

The Oklahoma utility plan includes

advertising allowances for builders who erect Reddy Kilowatt homes and thorough advertising follow up. Homes are provided with a large sign, and inside at every outlet Reddy Kilowatt tells just what that outlet will do on a little card affixed to it.

●

ADEQUATE WIRING ASSN., of Idaho, under the direction of C. P. Purkhiser, president, has organized a series of apprenticeship classes in Pocatello, Twin Falls, Boise and Payette. First school, started in Boise early in December and immediately split into two sections because of the unwieldly attendance, will be finished by the middle of the month. Plans are now being formulated for a two- or three-day all-industry adequate wiring meeting to follow the school.

●

GOLDEN GATE INTERNATIONAL EXPOSITION wiring will come under city ordinances, according to a ruling of the San Francisco Board of Supervisors in a new ordinance recently introduced. The ordinance contains a clause stipulating that electrical work is subject to inspection and approval of the chief of the department of electricity with a further condition that plans and specifications for work over a certain amount be submitted for approval.

Shorts

NOVEL yet effective use of hospital type of lighting unit in a church has been made in the Latter Day Saints, Ensign Ward Chapel in Salt Lake City, by the Wasatch Electric Co. Six Holophane built-in units with 200-watt lamps and 15 x 15″ lenses, were built into the ceiling over the rostrum of the chapel. The resulting lighting provides a high intensity of light down over the rostrum and yet keeps light out of the eyes of the congregation.

ILLUMINATING ENGINEERING SOCIETY has set forth definitely its position in regard to lamps bearing the I.E.S. name, initials and its insignia. In doing so it requests the observance of the policy suggested by it. Briefly, the society's name is not to be used in connection with fixtures or to describe a type of lamp which has not been actually certified by Electrical Testing Laboratory.

●

CITY OF SPOKANE is revising its electrical ordinance to conform with Washington state laws and to incorporate changes in the 1937 National Electrical Code. A zoning provision is made to limit the type of construction in the business district to ridged conduit.

●

LIGHTING MEN who have experienced indifference on the part of the medical profession are finding a series of articles appearing in *Hygeia*, the health magazine of the American Medical Assn., especially beneficial. Through the Better-Light Better-Sight Bureau reprints of the articles are offered the industry.

●

CHART OF ELECTRICAL SYMBOLS for architectural plans is being circulated by the Pacific Coast Electrical Bureau among every architect and builder in California. Similar distribution will be made of the revised Red Seal Wiring Standards as soon as these are off the press.

●

C. H. E. WILLIAMS CO., LTD., Vancouver, B. C., has been awarded contract for installation of sodium vapor lighting units on the Lions' Gate Bridge at the entrance to the Vancouver harbor.

●

VALUE AND IMPORTANCE of electric lighting in modern home-making and building is included in two new courses Edgar H. Wileman, southern California decorator, is giving at the University of California Extension Division, Los Angeles. Beauty and utility of illumination are stressed.

●

HOME ELECTRIC CO., Tacoma, Wash., has been awarded a contract for furnishing about $20,000 worth of bulbs and globes to the Tacoma Lighting Dept. during 1938. Award for street light globes was given to Love Electric Co. on a bid of $2,746.

●

CONTRACTORS' REFERENCE BOOK, a 100-page handbook containing the State of California contracting laws, is soon to be published by the California Contractors' License Board. Cost will not exceed 25 or 30c; size will be adaptable to that of a briefcase or portfolio.

New type of G-E sodium luminaire is now being used by the California Division of Highways and the City of Los Angeles to light highway intersections and underpasses. The unit burns a 10,000-lumen sodium lamp in a vertical position, the lamp enclosed in a diffusing globe. California is using this luminaire, with a companion open-type unit burning a horizontally mounted lamp, at 34 danger zones.

Graybar Expands in its New Salt Lake Building

Converting an old machine shop into a modern new warehouse and adding a new office and showroom wing, Graybar acquired 20,000 sq. ft. in which to expand its overflowing Salt Lake territory business. Manager Roy Kimberlin provided a wide truck delivery loading entrance (right) and a spur track loading entrance at the rear (left). Two floors and basement are so arranged to facilitate storage, pickup and delivery. Showroom occupies the street frontage (center), office just back of it, city pickup counter between office and warehouse at the rear

EDITORIAL

The Case for the Utilities

BEFORE the electrical industry can tell its story to the public it must know that story itself — know it thoroughly and convincingly. If the utilities must look to the public as a court of last resort, they must look to every man and woman engaged in the industry to act as their advocates. What story can these people take to the public?

Here is one phrasing of a convincing argument as presented by the Okonite Company in a full page advertisement in the annual edition of the *New York Sun*. It is quoted with the suggestion that every person in the industry read it and learn to tell it in their own language because it contains the facts which will controvert criticism:

The electric utilities are normally a spending industry. For the nine years, 1923-1931, they spent for capital investment an average of $758,000,000 per year. For the six years from 1932 to 1937, their average expenditure was $240,000,000 annually. The annual amount has been increasing, however, and last year it was 450 millions and this year is budgeted for approximately the same. To increase this annual expenditure, additional financing is needed, but capital has been slow to invest in electric utilities.

And so we have tried to see what the actual conditions are that have made new financing by the utilities difficult, and this is what we find:

1. Lower rates. In 1932 the average rate paid by a residential user of electricity was 5.57 cents per kilowatt-hour. In 1937 it was 4.37 cents. The average home used 597 kilowatt-hours in 1932 and 797 kilowatt-hours in 1937. This looked like good business because the average bill was higher in 1937 by $1.58—but

2. Taxes are higher. We find that every sixth dollar the utilities take in has to go to the tax collector. The bill for electricity in the average home in 1932 contained only $3.89 for taxes, but in 1937 it was $5.57, or $1.68 more. So we found that instead of getting $1.58 more out of the average home, the utilities got 10 cents less. And, we must consider that

3. Wages are higher. The utilities employ 27 per cent more people than they did at the low point of 1933 and the amount received weekly by the average employee is 19 per cent above the low. Wages in the utility industry today are well above those paid in 1929. And so it is natural to find that

4. Net income is down. The net available for interest and dividends in 1932 was $728,000,000. In 1936 it was only $716,000,000 and finally

5. That potential investors are afraid to invest in electric utility securities because of government competition and excessive regulation.

After listening to the President's annual message to the Congress, we began to take stock of America's third industry and found:

A—Here is an industry that has constantly lowered prices.

B—Has increased employment and compensation substantially.

C—Has, year after year, taken an increased tax load (its 1937 tax bill was 330 millions or 77 per cent of its entire labor bill). Since 1931, it has paid out in taxes 1½ billions.

D—Has contributed to the more abundant life by increasing the use of electricity in the average home.

E—Its investors are taking no more in interest and dividends than they did at the bottom of the depression.

E—In spite of all, it is contributing about half-a-billion a year to the capital goods industries for new materials and equipment.

After reviewing the above, it looks to us as though the electric utilities industry measures up in every respect to what the President asks of all industry.

The outstanding problem at the present time seems to be the resumption of investment in the electric utilities. To accomplish this, investors must again be convinced that electric utilities are a sound investment. Therefore, they must be assured by government that their investments will be protected against stifling regulation and government competition.

The industry can well afford to salute the Okonite Company for placing this story before one segment of the public. By retelling in every section of the country, these facts cannot help but offset some of the pressure against a business which can help the nation back to prosperity.

High Pressure Salesmanship?

SO NOW it is "high pressure salesmanship" that is causing the recession! Conversely, to stop the recession, stop salesmanship. Nice thinking, if you can get it.

Speakers at the Radio and Appliance dinner of the Western Furniture Market, last month in San Francisco, left very little debris when they blew that quaint sophistry to bits. What, asked the witty Harry Brown, Philco's merchandise manager, had been responsible for bringing the pleasure and enlightenment of radio to American homes at such low cost, but salesmanship—applied with pressure sometimes, it is true? What introduced 30 million radio sets, millions of refrigerators, ranges, appliances, furnishings to American homes, but salesmanship? Why are America's homes the best equipped, the best furnished; why do they enjoy the highest standard of living of anywhere in the world—but for salesmanship? What has caused our production methods, which in turn have brought highest wages, most widespread distribution of production—but salesmanship? Doubt it? Examine countries where there is poor salesmanship and you find more poverty, less of the good things of life, low living standards and fewest facilities for an abundant life. In fact, had it not been for sales-

manship the recession would have proved more severe, more depressing and with brakes put on salesmanship we will never get out of it.

In reaching around for a new scapegoat on which to focus public blame, salesmanship was a poor choice in a nation of salesmen. There are comparatively few people who feel that salesmanship ever hurt them much, even if it did hasten their decision to buy something they didn't have.

From Home to Industry

HOW worth while is domestic load building? The question, spurred on just now by the clever arguments of the gas interests, has been bothering more than one management. Those who have doubted the value of an intensive domestic load building program in view of its narrowing return per unit of sale may well prick up their ears to what W. C. Mainwaring of the B. C. Electric Railway Co. had to say to the Canadian Electric Association convention at Calgary last month.

Abnormally increased demand for commercial lighting, he told the convention, had finally been traced back through and discovered to have been stimulated by the domestic lighting service program. The home lighting girls had so thoroughly sold the home on better lighting that the business executive in the home had arrived at the logical but unexpected conclusion that if it was good for his home, it was good for his business, too. Mr. Mainwaring also suggested that power applications might just as well be developed by following through on the psychological reaction to a successful domestic campaign.

It is such intangible threads of interconnection of interest that bind the entire load building job together. Any one class of load may be either a boon or a detriment if too much of it is signed and the balance and proportion upset. The industry at various times has feared the effects of neon sign load, of electric heating load, of water heating. Yet when every phase is developed, the infection of the electric idea which spreads to other applications often more than compensates for the temporary unbalance.

What the Public Thinks

GAGING public opinion is a scientific procedure. However, almost everyone likes to feel that he is a self-appointed expert at measuring public reactions on everything from elections to breakfast foods, and he is shocked when he finds that his opinions are mistaken. A little analysis should show why mistakes are made—the temptation of accepting our own immediate circle of friends as representative of the public as a whole accounts for the error. (For proof review your own estimate of the outcome of the last presidential election.)

As a check of the logic of this ELECTRICAL WEST submits a problem culled from among the many periodic surveys which are being made of public reaction. One organization recently surveyed public attitude toward big business. Among the questions asked was "What corporations do you think fool the public?" Some 2000 people in five metropolitan centers were interviewed. Many mentioned specific companies; others refered to industries in general. All of the answers were grouped by industries. The following list contains the ten mentioned most frequently, arranged alphabetically. On page 84 of this issue they are ranked numerically from one to ten according to the public's estimate of their trustworthiness. Rate them yourself and then compare your answers to determine your expertness as a judge of public opinion:

Automobile ..... ( )
Chain stores ..... ( )
Department stores ..... ( )
Drugs, cosmetics and soaps ..... ( )
Financial ..... ( )
Food ..... ( )
Gasoline and oil ..... ( )
Public utilities ..... ( )
Steel ..... ( )
Tobacco ..... ( )

Appreciation

IN presenting this, ELECTRICAL WEST's nineteenth annual review of electrical progress and opportunity here in the 11 Western states, the editors have assembled a handbook of statistical material from all available sources. Data presented review last year's accomplishments and outline the programs for the year to come. The result is a gage of markets and a summary of what the industry may expect to achieve during the balance of 1938.

The task of the editors was merely one of assembly and editing. Most of the information was contributed by scores of people in utilities, in the different associations and various branches of the industry. To them we express our thanks and appreciation with the hope that this issue will serve a useful purpose as an analysis and guidebook indicative of a prosperous and progressive future.

ELECTRICAL WEST

DEVOTED TO THE ECONOMIC PRODUCTION, TRANSMISSION AND DISTRIBUTION OF ELECTRIC POWER AND ITS APPLICATION TO INDUSTRY, COMMERCE, AGRICULTURE AND HOME IN THE PACIFIC EMPIRE, AND TO THE MARKETING OF EQUIPMENT AND APPLIANCES AND OTHER UTILIZATION DEVICES IN THAT AREA

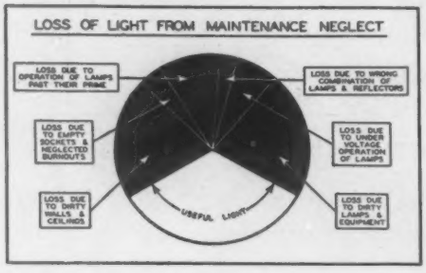
Toward More "Seeing Ability"

By SAMUEL G. HIBBEN
Director of Applied Lighting
Westinghouse Lamp Division
Bloomfield, N. J.

IN ANY discussion of lighting economics one naturally asks the question, "How should lighting equipment be cleaned and what does it cost?" In general the experience of past years has shown that bulbs and reflectors should be wiped free of dust at least once each month. Except in unusually dirty locations they should be washed at least once every 60 days. It is not a bad plan to alternate dry and wet cleaning. In a typical office building the average janitor can remove the glassware from an overhead fixture, scrub, dry and replace it, in from 4 to 5 min.

Under such circumstances data collected in two large buildings showed that the complete cost of cleaning maintenance per visit varied roughly from 5c to 15c. Looking at the problem in another way, consider the office building where the annual electric power costs were some $8,770. The cost of lamp bulbs and the insertion thereof was about $1,035 while the annual total cost of lighting equipment maintenance, including breakage, and supervision was some $4,600.

Stubborn cases of encrusted, greasy dirt require warm water and soap or a mild grease solvent. Extreme cases


LOSS OF LIGHT FROM MAINTENANCE NEGLECT
LOSS DUE TO OPERATION OF LAMPS PAST THEIR PRIME
LOSS DUE TO WRONG COMBINATION OF LAMPS & REFLECTORS
LOSS DUE TO EMPTY SOCKETS & NEGLECTED BURNOUTS
LOSS DUE TO UNDER VOLTAGE OPERATION OF LAMPS
LOSS DUE TO DIRTY WALLS & CEILINGS
LOSS DUE TO DIRTY LAMPS & EQUIPMENT
USEFUL LIGHT

of hardened sooty deposits, particularly on outdoor surfaces, may require a dilute solution of oxalic acid. After the common washing with soapy water, and to avoid the soap film that will hold the next deposit of dust, wipe and dry the reflector carefully or preferably rinse in ammonia water.

Cleaning costs vary, but taken alone they seem to average in the neighborhood of 4 per cent of the total operating costs of a lighting installation. If, as seems evident, such cleaning will in itself increase the illumination 20 or 25 per cent, then the results pay for the expenditure four or five times.

The accessibility of the lighting unit (and the lamp) is very important. In commercial installations, if the bulb can be removed without taking down the globe, the maintenance is simplified materially. In industrial installations, the "safe-change hanger" or disconnecting plug facilitates removal of both reflector and lamp to the floor for easy washing. Just what this means in economy is illustrated by the following study.

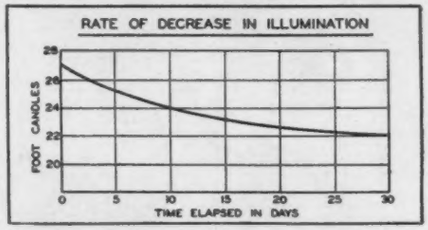
Saved $1,295.80 per Year

To clean 5,700 Glassteel lighting units, in their regular overhead position, at eight minutes each, required 45,600 min., or 760 hr. (Labor for this operation costs 62c per hour). Therefore, the cost of each complete plant wash is 760 x 0.62—$471.20. Considering four washes per year, the yearly cost equals 4 x $471.20—$1.884.80. With a cleaning time per unit of 2½ min., made possible by a removable hanger, it takes 14,250 minutes, or 237½ hr. to clean the 5,700 Glassteels. With labor at 62c per hour, the cost for one complete wash is $147.25. The yearly cost or the cost of four complete washes — $589.00. Thus the installation of safe change hangers effected a saving of $1,295.80 per year, or 68 per cent of the yearly cost of keeping lights clean and efficient.

What we have discussed about dirt on the reflector applies in principle to grimy or discolored interior surfaces. Neglecting for a moment the efficiency differences of various colors of painted surfaces, we may consider merely the losses due to neglect thereof. In an enclosed space such as a small room any change in the light reflected by the walls and ceiling will change the light available at work level almost in the same proportion.

Individual studies must be made to ascertain how frequently an interior may be repainted, but it seems common practice to find it economical to wash most painted interiors once annually. How much the reflection coefficient may be increased by washing is impossible to answer definitely but many studies indicate that an increase on the order of 10 per cent is not uncommon.

Our third item of neglected maintenance has to do with lamps of poor quality. The cost of the lamp bulb is merely a small "down payment" on the cost of lighting. It usually represents less than 10 per cent of the total and a few cents difference in the cost of the bulb is really negligible, whereas a few per cent difference in output efficiency is vitally important. If we evaluate lighting costs properly we find that a deficiency of 6 per cent in the lamp efficiency is about equal to the average first cost of the lamp. Hence inefficient lamps are not cheap at any cost and, if the poor lamp is 7 per cent less efficient than a reputable good one, then the purchaser should really be given a



bonus to compensate him for his lighting losses.

Inefficient lamps are "wolves in sheep's clothing." They are like a leaky faucet because the longer they are in operation the more they rob the user. A cardinal rule of good maintenance is to strengthen this link of the economic chain by beginning with a reputable lamp bulb.

This is the second of three articles on lighting efficiency.—*Editors.*

●

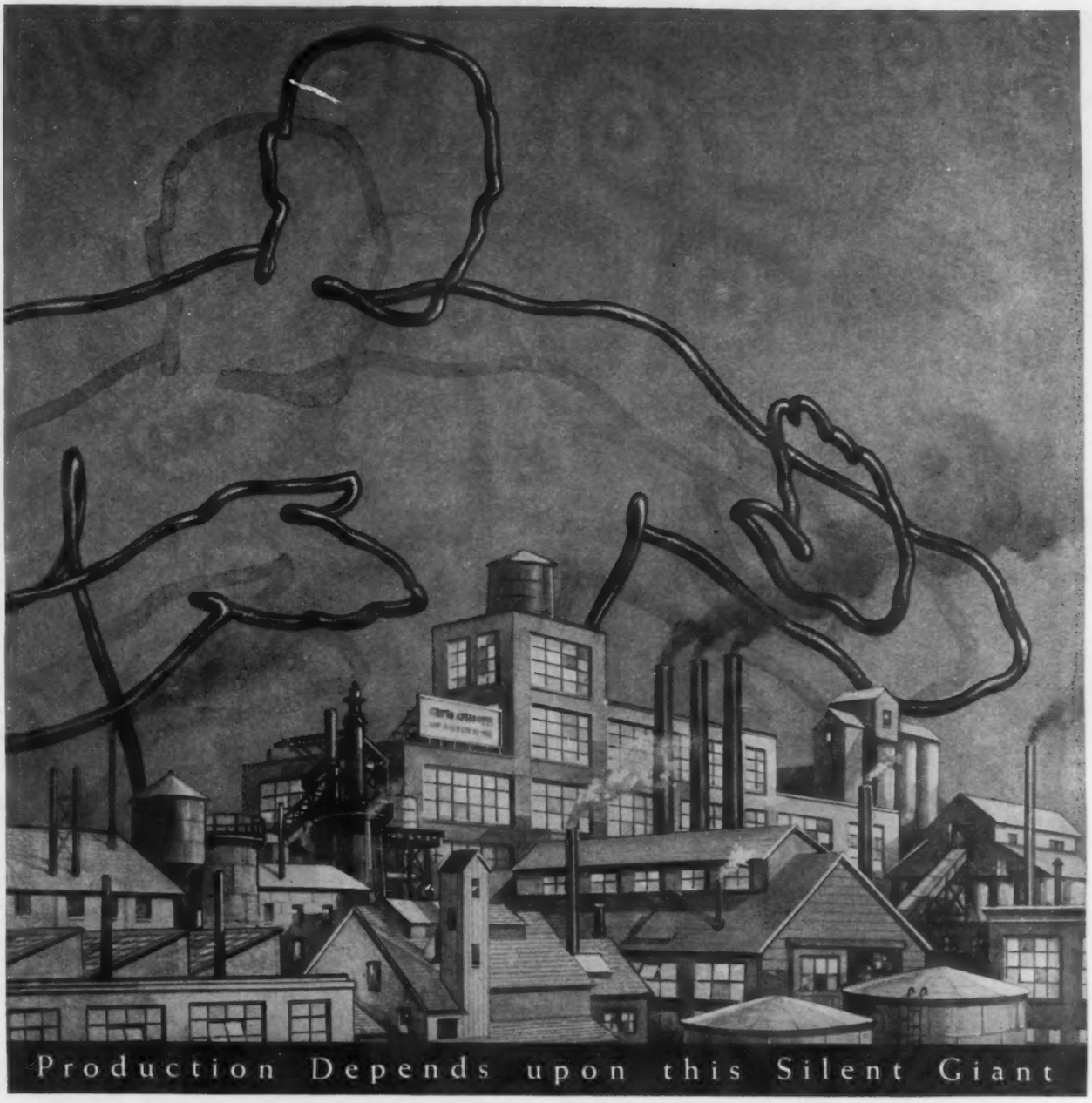
Question Corrected

In connection with the question on finding wire size in a 3-phase, 4-wire circuit, which appeared in the December 1937 maintenance section, page 45, Harold Gerber, chief electrical inspector of the San Francisco Department of Electricity has called attention to an error.

In the equation for current:

$$I = P/3E$$

I is the current in any leg (for balanced load at unity power factor) if E is the voltage from phase to neutral. Since this is 120 volts in the example given, 120 should have been used in the sample calculation, thus raising the current to 28 amp. Application of this current figure in the next formula correspondingly raises the required circ.-mil wire area to 19,600, and the required wire size to No. 6.



The network of wires and cables through which courses the lifeblood of industrial production — electric power. For power and lighting circuits experience commends GUARDIAN — *the product with General Cable responsibility behind it.*

GUARDIAN

FLAME-RETARDING • MOISTURE-RESISTING

BUILDING WIRE

BRAIDED OR LEADED • COMPLETE SIZE RANGE • STOCKED AND SOLD BY ELECTRICAL WHOLESALERS EVERYWHERE

Manufactured by GENERAL CABLE CORPORATION

Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cleveland, Dallas, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Rome, (N.Y.), St. Louis, San Francisco, Seattle, Washington, (D. C.).

GENERAL CABLE

A STANDARD OF QUALITY FOR OVER HALF A CENTURY

NEWS OF THE INDUSTRY

COMPROMISE OFFERED SACRAMENTO BY P. G. & E.

Proposed by Pacific Gas and Electric Co., Jan. 17, was a compromise with the Sacramento Municipal Utility District whereby the district would abandon its plan to condemn the company's distribution system in Sacramento, Calif., and the company would withdraw actions pending in federal courts to invalidate the district's $12,000,000 bond issue voted in 1934.

With approval of PWA and the California Water Project Authority (Central Valleys Project) the way would be clear for a contract whereby the district would build its $13,500,000 hydro generating unit at Silver Creek and sell the entire output to the company.

The proposal embodies five points:

1. Dismissal of the company's court action.
2. Abandonment of the district's condemnation proceedings.
3. Construction by the district of Silver Creek plant with the understanding the district would not seek to acquire a distribution system either by condemnation or construction for a period of twelve years.
4. Agreement by the company to purchase all output for 40 years, subject to the district's right to terminate the contract at the end of twelve years.
5. Payment by the company of some $900,000 per year, estimated to allow the district an annual net profit of $350,000.

Thus clearing the way for sale of the bonds would remove obstacles to acceptance of a $4,000,000 PWA grant.

District engineers have stated that the proposed compromise would in no way conflict with interests of the Central Valleys Project.

Should the compromise go through, P. G. & E. might postpone construction of its proposed Cresta hydro plant on the Feather River.

PROPOSAL OF PORTLAND GENERAL ELECTRIC CO. to absorb through merger five of its subsidiaries — Yamhill Electric Co., Mollala Electric Co., Electric Supplies & Contracting Co., Electric Appliance & Construction Co. and Clackamas Power & Irrigation Co.—was to be heard by the Federal Power Commission Jan. 24. Plan provides that the Portland company will receive all assets and assume all liabilities of the five companies, and that all stock and securities of the five companies will be surrendered and the companies dissolved.

REDRAFT OF THE MANSFIELD BILL, which would set up regional authorities to deal with the nation's water resources, is soon to be submitted to the House Rivers and Harbors Committee. As revised, the bill will probably provide only for regional planning authorities: the functions of existing federal or state agencies will not be disturbed, power authorities modeled after the TVA will not be included.

APPROVAL OF MOUNTAIN STATES POWER CO.'s petition to reorganize under Sec. 77B of the Federal Bankruptcy Act was given last month when the U. S. District Court in Delaware fixed Jan. 28 as the date for a hearing upon the question of whether the company should continue in possession of its property or trustees be appointed.

UTAH COMMISSION ORDERS $350,000 RATE REDUCTION

First stage of the rate reductions which will save Utah customers of Utah Power & Light Co. approximately $350,000 annually went into effect Jan. 1 following conclusion of the rate case brought against the company by the state public service commission four years ago.

The ultimate savings to be made possible by the order—affecting all classes of power users—will bring total reductions ordered by the commission since instigation of the case Dec. 13, 1933, to about $850,000.

Final reductions will be made April 1 and July 1, 1938.

New residential schedule, which will be applicable to all urban and rural customers, calls for a 90c charge on the first 11 kw.-hr.; 5c per kw.-hr. for the next 25 kw.-hr.; 2.5c for the next 164, and 1.5c for all additional.

Charges under the commercial schedule will be: 90c for the first 11 kw.-hr.; 5c per kw.-hr. for the next 500 kw.-hr.; 4.5c for the next 500; 4c for the next 1,500; 3.5c for the next 10,000, and 2.5c for all additional.

In fixing a valuation on the property of the company of $73,045,647, the commission rejected the reproduction-cost-new theory as the sole method of arriving at the rate base.

Besides ordering the rate reductions the commission required the company, beginning this year, to place $1,000,000 annually in the depreciation reserve. Since 1933 the company has appropriated $700,000 annually to retirement reserve.

ROSS NAMES ELEVEN TO BONNEVILLE STAFF

Taking advantage of President Roosevelt's appropriation of $165,000 for Bonneville administration expense, Administrator J. D. Ross last month rounded out his staff of direct aides by naming Isaac Comeaux, former chief accountant of the City of Seattle, as financial adviser of the project. Also appointed were four engineers, a public relations man and five field examiners.

Electrical engineer for the project is Robert William Beck, formerly in charge of valuation studies for the State of Nebraska's PWA power network and an Oregon State College student.

Engineering work on rates and prospective transmission lines is in the hands of George H. Moore, Perry J. Alvey and Charles Carey. Stephen B. Kahn, Portland attorney formerly connected with the TVA, is to have charge of public relations.

Of the five field examiners, three will work in the State of Washington, two in Oregon. Washingtonians are Frank Fitts, formerly with the Seattle *Post-Intelligencer* and member of the city council; Neal Jones, former editor of the Seattle *Star*, and Fred J. Chamberlain of Puyallup, recent secretary of the Washington State Grange. The Oregon men are prominent politicians: Morton Tompkins of Dayton, former member of the legislature and overseer of the Oregon State Grange, and Byron C. Carney of Milwaukie, state senator from Clackamas County.

Duty of the examiners is to discuss with all persons interested the possibilities of obtaining Bonneville power.

Largest part of the appropriation for Bonneville administration, $147,420, will be applied on the project payroll of 53 permanent employees. Principal salaries are: administrator, $10,000; chief engineer, $7,500; chief counsel, $7,500; electrical engineer, $5,600; economist, $5,600; chief of information, $5,600; counsel, $4,600; office engineer, $4,600.

The President's budget also called for an as yet unapproved appropriation of $1,450,000 for the construction, purchase and maintenance of transmission lines, easements and rights of way for the project.

Toward the end of the month, Ross, bolstered by the public assurance that his negotiations with private utilities had White House approval, traveled to Washington to appear at House hearings on the appropriation bill.

CENTRAL ARIZONA L. & P. REDUCES RATES $200,000

Rate reduction in excess of $200,000 per year was put into effect Feb. 1 by Central Arizona Light & Power Co. It was the second $200,000-per-year reduction in a little over three years.

New residential rate will be 2c per day and 4c per kw.-hr. for the first 100 kw.-hr, 3c for the next 90 and 2c for all additional. Commercial rates for all customers with demand of 3,000 watts or less will be 2c per day and 3-8/10c per kw.-hr. for the first 500 kw.-hr., 3c for the next 1,500 and 1½c thereafter.

Important item in the new schedule is a new rate designed especially for combination power and lighting service for small business customers. The rate combines both power and light in one meter and is optional with the consumer. It is said to be one of the first of its kind in the nation.

RATES FOR STREET LIGHTING in various southern California cities served by Southern California Edison Co. were reduced last month by $50,000 annually. Largest saving will be realized by Los Angeles, which will benefit to the extent of $38,200.

REDUCED LIGHTING SCHEDULE of the Nelson, B. C., municipal utility was to go into effect this month. New residential rate is 8c per kw.-hr. for the first 20 hours; 2½c for the next 200; ½c for the next 280, and 1c for all above.

ELECTRIC RATES for the Fraser Valley area of British Columbia and the municipalities of Burnaby and North and West Vancouver have been reduced by the B. C. Electric Railway Co. to 5c per kw.-hr. for the first 30 kw.-hr., 2c for the next 200 kw.-hr. and 1c for all additional time.

●

PACIFIC GAS AND ELECTRIC CO. last month filed with the California State Railroad Commission application for authority to issue and sell $15,000,000 par value of its first and refunding mortgage series "I" 3½ per cent bonds, maturing June 1, 1966. The application marked the first time in six years that the company has entered the market for new capital. Purpose of the issue, according to President J. B. Black, is to replenish working capital and provide additional funds for construction purposes.

●

CONSTRUCTION OF THE 53-MI. transmission line on Orcas Island, Wash., was started last month by NePage-McKenney Co., Seattle, following federal approval of the company's $75,000 bid.

SUPERIOR
REG. U. S. PAT. OFF.

*(BAIS-20)

WE ARE *Not*
"THE COMMISSION"
AND
WE *Can't* INCREASE
YOUR RATES

BUT . . .

We can help you get paid for all energy consumed.

SUPERIOR APPARATUS IS
Designed FOR THAT PURPOSE

Superior Switchboard & Devices Co
Canton, Ohio

*Been at it Since 1920

SUPERIOR
REG. U. S. PAT. OFF.

Reliable

STRAIGHTLINE SPLICE

If the lineman can push the wire into the Splice, the wire is in to stay.

Ends fitting wire closely prevent insertion of wires that are burred or out of shape—prevent insertion of oversized wires—eliminating possible troubles.

Splices develop approximately 100% strength of solid wires and approximately 98% on seven strand, which is more than the strength of the wire in the line.

Made entirely of non-corrosive parts — can be cleaned and reused.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
[illegible] CARROLL AVENUE CHICAGO ILLINOIS

NEW WESTMINSTER, B. C., city council, troubled by the information that 18 dwelling house electric meters had been tampered with and that 30 more residences showed evidence of "jumper" wires in operation, is conducting an investigation of the 5,000 electric light services in that city.

●

WEST KOOTENAY POWER & LIGHT CO. is negotiating with representatives of Doukhobors, in the British Columbia interior, concerning compensation payments for lands which may be bought by the company if the proposed new $5,000,000, 100,000-hp. power plant is erected on the Columbia River near Brilliant, B. C. Amount involved in the negotiations is about $125,000.

●

LEWIS COUNTY COMMISSIONERS at Chehalis, Wash., have postponed until Feb. 21 their decision on the Puget Sound Power & Light Co.'s application for power line franchise on some 30 roads in southern and eastern sections of the county. Announcement was made when commissioners of the county public utility district declared progress was being made on an REA loan in an area included under the utility's application.

●

POWER DEVELOPMENT PROJECT which includes harnessing the Swamp River and constructing a dam and turbine to produce an ultimate 30,000 hp. will be carried out at Barkerville, in the Cariboo area of B. C., by the Barkerville Development Co., a private corporation. The project will furnish power to mining companies in the territory.

●

SAFE-DRIVING PROGRAM designed especially to promote safety during the holiday season but also scheduled for extension into 1938, was adopted recently by employees of Southern California Edison Co. Approximately 3,500 employees voluntarily subscribed to the program.

●

CONSTRUCTION OF A $41,000 mercury arc rectifier substation for the British Columbia Electric Railway Co was to be started recently. Located at 41st and Dunbar Sts., the new station will be the third built by the utility. It will improve regulation on the 500-volt street-car lines in the Kerrisdale and Dunbar areas.

●

SITE ON THE OLYMPIC PENINSULA near Ewell's Falls on Ziegler Creek has been selected by the Quinault Light Co. for a power house and diversion dam. A 250-kw. generating unit will operate under a head of nearly 900 ft. The project, financed by a rural electrification loan, will cost $60,000.

Portland G. E. Signs Contract with E. H. F. A.

Electric Home & Farm Authority's appliance financing plan got under way in Portland and vicinity last month following notification of dealers that Portland General Electric Co. had closed a contract with the authority. Assisting the government agency in superintending the operation of the plan are three men from the utility's merchandising staff whose full time has been delegated to the job.

The contract, closed largely because of the company's low domestic rates, follows the authority's standard plan.* It was the second such contract to be signed on the Pacific Coast, the first being signed with the Los Angeles Bureau of Power & Light.

A third and similar contract has also been closed with the City of Lodi, Calif.

Contracts

HUME & RUMBLE, LTD., Vancouver, B. C., submitting a bid of $12,492, has been awarded the contract for supplying and installing underground cable, boundary lights, green markers and red obstruction lights at the Vancouver municipal airport at Sea Island.

●

C. C. MOORE & Co., Seattle, submitted the low bid, $47,496, to the Bureau of Yards & Docks, Washington, D. C., for improving the power plant at Sand Point Naval Air Station near Seattle.

●

CONTRACT FOR COPPER WIRE has been awarded Graybar Electric Co., Tacoma, Wash., by the Tacoma Board of Contracts and Awards. The firm's bid was $6,652.

●

CONTRACT HAS BEEN AWARDED the Standard Construction Co., Ltd., Vancouver, B. C., for the installation of a hydroelectric plant to supply power to the gold dredges of Fraser River Golds, Ltd., at Jones Creek, B. C. Involved is an outlay of $50,000 for construction of a dam, ¾-mi. of pipe line, power house and transmission line.

●

A. S. SCHULMAN ELECTRIC Co., Chicago, has been awarded the contract, on its bid of $23,788, for furnishing and erecting galvanized steel structures at Seattle City Light's south receiving substation.

●

MEACHAM & BABCOCK, Seattle, have been awarded the contract for electrical work in connection with the building of the $850,000 National Guard armory in Seattle. Bid was for $33,965.

* Electrical West, October, 1936, page 21.

Every wired home in the United States will receive a total of more than 31 advertising impressions on G-E bulbs and lighting in 1938.

THE LIGHTING MARKET HAS NO SATURATION POINT!

They stay brighter longer

FOR 39 years General Electric has been advertising lamps and lighting . . . continually urging your customers to use more and more light.

During the past year alone, General Electric has made 400,000,000 advertising impressions in leading national magazines . . . plus 150,000,000 more in newspapers . . . plus 150,000,000 more in its "Hour of Charm" radio program. A total of more than 31 lamp and lighting advertising impressions per meter.

Results of this advertising are evident not only in the yearly sales increases in lamp bulbs but particularly in the significant sales increases of 100, 150, 200-watt lamps and higher. They are also evident in the sales of I. E. S. Better Sight Lamps which now produce 150,000,000 added kw-hr.

General Electric will continue this lamp and lighting advertising during 1938 . . . and in the years to come. Because the market for *lighting load is the only one that has no saturation.* General Electric Company, Nela Park, Cleveland, Ohio.

GENERAL ELECTRIC

A GRIP FOR ALL NEEDS

No. 1628-5 B. "Chicago" Grip. Maximum opening .563. Minimum opening .115. Safe Load, 8,000 lbs.

Here's the new "Chicago" Grip capable of handling messenger or guy strand from 3/16 in. diameter up to 1/2 in. diameter. A genuine all purpose grip that can also be used satisfactorily on bare conductors, solid or stranded, from No. 6 to No. 4/0 seven strand copper and A.C.-S.R. up to No. 3/0. A grip that even satisfactorily handles the new three-strand "copperweld" conductor. The bronze-lined jaws prevent slippage. This new grip will afford a sure hold under all conditions, with loads up to 8,000 lbs.

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons Established 1857 Chicago, Ill. U.S.A.

9200 BELMONT AVENUE

Company Finances

SPECIAL DIVIDEND of 25c per share of common stock plus the regular dividend of 37½ per share has been declared by directors of Southern California Edison Co. payable Feb. 15. Special dividend of equal amount will also be payable April 15 on original preferred stock.

GROSS OPERATING REVENUES of San Diego Consolidated Gas & Electric Co. for the year ending Nov. 30 totaled $8,165,691 as compared with $7,819,160 for the previous year.

GROSS OPERATING REVENUES of Southern Colorado Power Co. for the year ending Nov. 30 totaled $2,337,526 as compared with $2,178,112 for the previous year.

GROSS OPERATING REVENUES of California Oregon Power Co. for the year ending Nov. 30 totaled $4,652,549 as compared with $4,398,709 for the previous year.

GROSS OPERATING REVENUES of Mountain States Power Co. for the year ending Nov. 30, 1937 were $4,031,370. Revenues for the corresponding period 1936 were $3,632,230.

●

WASHINGTON STATE PUBLIC SERVICE DEPT. has given the Puget Sound Power & Light Co. until July 1 to comply with its order forbidding continuance of discriminatory rate practices with Seattle apartment house owners. Original effective date of the order, made in October, was Jan. 1. The power company requested extension of time because of the necessity for purchasing and installing 6,000 meters.

Answers to What The Public Thinks

How the public rated various industries in answers to the question, "What corporations fool the public?" as set forth in the editorial on page 77 is as follows:

1. Public utilities, 11.7 per cent.
2. Drugs, cosmetics and soaps, 8.6 per cent.
3. Tobacco, 6.2 per cent.
4. Automobile, 4.3 per cent.
5. Financial, 3.7 per cent.
6. Food, 3.2 per cent.
7. Gas and oil, 2.1 per cent.
8. Steel, 2.0 per cent.
9. Department stores, 1.5 per cent.
10. Chain stores 1.3 per cent.

The percentage is the ratio of the answers citing that specific industry to the total number of answers.

WAGE SCALE of $1.37½ an hour for linemen and $1 an hour for helpers on rural electrification projects in western Washington has been announced by the Electrical Workers Union. In eastern Washington the scale will be $1.25 and 90c an hour.

●

HEARING ON THE POWER CAPACITY and annual charges of Pacific Gas and Electric Co.'s project No. 708, located on the Stanislaus River, Calif., has been postponed by the Federal Power Commission until Feb. 14.

●

HEEDING A FEDERATION OF LABOR protest, the U. S. Department of Labor has recommended that wages similar to those at Ruby Dam be paid the 3,000 laborers who will be employed under the new Grand Coulee contract. Some $30,000,000 in wages is involved. Ruby Dam workers are paid 90c an hour for unskilled labor; up to $1.75 for skilled.

●

PURCHASE BY THE Seattle City Employees' Retirement System of $750,000 of Seattle City Light bonds yielding 4.6 per cent interest has been authorized by the city council.

●

LYNDEN, WASH., CITY COUNCIL is considering construction of a municipal light and power plant, cost of which will be covered by a proposed bond issue.

Associations

Meeting in San Francisco to discuss changes in the 1937 edition of the National Electrical Code, the Northern California Chapter, Southwestern Section, I.A.E.I., last month voted to hold four evening sessions a year in addition to the annual section conference.

Discussion of the code changes was led by Harold Gerber of San Francisco, secretary-treasurer of the organization. Mr. Gerber also offered to present at the next meeting, to be held in Oakland, April 13, the results of experiments conducted by the San Francisco Department of Electricity on wiring to enclosed lighting fixtures in or near combustible material.

Appointment of Ben C. Hill as vice-chairman of the chapter was announced by Chairman A. V. Youens.

Thirteenth annual conference of the business development section, Northwest Electric Light & Power Assn., will be held at Medford, Ore., March 16-18. Reservations for rooms should be made through Glenn L. Jackson, vice-president of California-Oregon Power Co.

SOUTHERN CALIFORNIA BRANCH of the Heating, Piping and Air Conditioning

Every Operation — *from Copper Bar to finished Magnet Wire*

IN ROEBLING'S OWN PLANT

...one of the country's most modern copper mills

FROM processing of the copper bar to the final winding and spooling, every operation in making Roebling Magnet Wire is under our own close control. Uniformly high quality of Roebling Magnet Wire is guarded every step of the way.

It is available in round, square and rectangular types in a wide range of gauges. A variety of coverings including cotton, asbestos tape and cotton, silk, enamel, paper, enamel and single silk, enamel and single cotton.

We welcome your inquiry for further information, prices and samples.

JOHN A. ROEBLING'S SONS CO. OF CALIF.
San Francisco Seattle Los Angeles Portland

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

Cold days, these...

unless you are lucky enough to be handling General Electric Heating Devices.

Then, of course, you are spending profitable hours in a warm store. You have the advantage of selling the complete accepted line of Heating Devices. Your customers feel assured that each General Electric Heating Device you supply will be of the same high quality as the previous G-E appliance purchased.

General Electric Heating Device advertisements in the 15 leading National Monthly Magazines with a total circulation of over 25,000,000 and an estimated readership of over 100,000,000 is bound to create a tremendous store patronage for you. Use the many free sales promotion helps which General Electric offers you for local tie-in so that you may direct these prospective customers to your store and thus profit to the utmost.

SALES HINT OF THE MONTH

Set up a complete window of General Electric Heating Devices using the free Streamlined Iron and Table Appliance Display Cards as a background. Feature the complete new roaster deal in the most favorable traffic location.

Make a mailing of the General Electric Heating Device Full Line Folder to a selected list of your customers. Promote the complete line of General Electric Heating Devices.

GENERAL ELECTRIC

Contractors' National Assn. has been formed in Los Angeles. Offices are in the Beaux Arts Bldg.

TO REACH A LARGER PROPORTION of its membership, the Pacific Coast Electrical Assn. has scheduled the following meetings for February: Watsonville, Feb. 25 and San Diego, Feb. 16. The San Bernardino meeting was held Jan. 21; the Bakersfield meeting, set for Jan. 28, was postponed because of conflicting attractions.

ANNUAL WINTER CONVENTION of the American Institute of Electrical Engineers was held in New York City Jan. 24-28.

R. E. A. Activities

BIDS FOR CONSTRUCTING a power plant for Surprise Valley Electrification Project were rejected last month because the board of directors held the figures were too high. Project engineers estimated the cost at $15,000; bids ranged upward from $22,000.

LOWER VALLEY POWER & LIGHT, INC., Freedom, Wyo., opened bids Jan. 26 on materials required for erection of a generating plant.

CLEARWATER VALLEY LIGHT & POWER ASSN., Lewiston, Ida., has awarded a contract to Wayne-Burnaby, Inc., Spokane, for building the second section of the project. Bid was $311,958. Involved are 383 mi. of line.

UMATILLA ELECTRIC COOPERATIVE ASSN., Hermiston, Ore., has awarded a contract to Newport Construction Co. and Kern & Kibbe, Portland, for building the entire 126-mi. project. Bid was $107,638.

INLAND EMPIRE ELECTRIFICATION, INC., Spokane, has awarded a contract to Fritz Ziebarth, Long Beach, Calif., for building 197 mi. of line, the second section of the project. Bid was $163,249.

MORGAN COUNTY RURAL ELECTRIC ASSN., Fort Morgan, Colo., opened bids on the construction of 248 mi. of line Jan. 20.

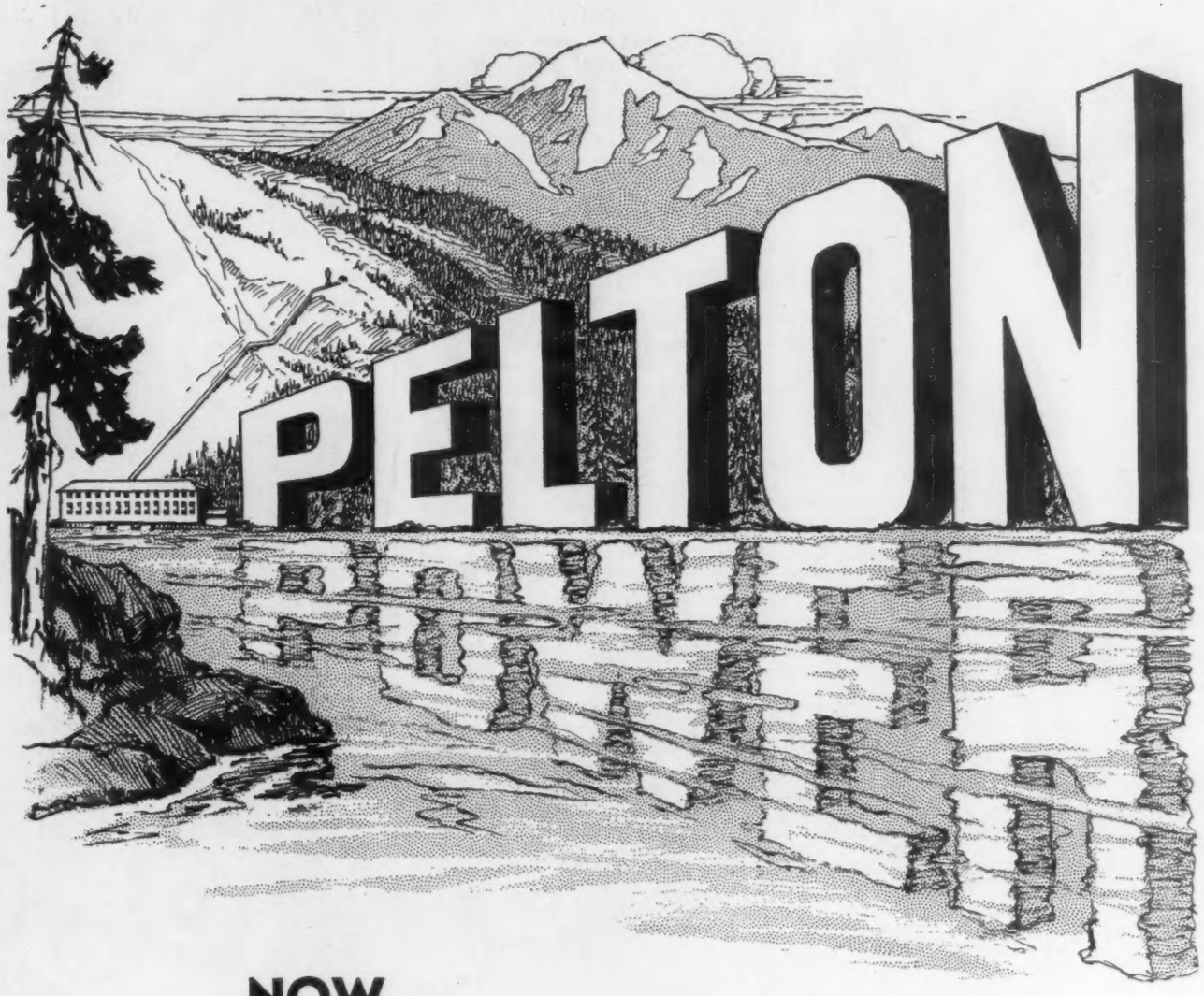
BENTON RURAL ELECTRIC ASSN., Benton City, Wash., has awarded a contract to Homer G. Johnson, Portland, for building the entire 41-mi. project. Bid was $34,265.

ORCAS POWER & LIGHT CO., East Sound, Wash., has received from REA an additional allotment of $33,000 to complete the project and to defray expenses connected with its initial operations. The allotment makes a total of $120,000 awarded the project.

MUTUAL POWER & LIGHT ASSN. OF TANNER, North Bend., Wash., has received from REA an additional allotment of $3,000 to complete the project and defray expenses connected with its initial operation.

RECENTLY ENERGIZED PROJECTS include those in Bonner County, Ida.; Richland, Yellowstone, Madison and Ravalli Counties, Mont., and Goshen and Platte Counties, Wyo.

PLUMAS-SIERRA RURAL ELECTRIFICATION COOPERATIVE, preparatory to construction of 229 mi. of line, was making a survey in Plumas, Sierra and Lassen Counties, Calif., last month.



NOW... as since the pioneer days of power development, this company maintains a complete staff of hydraulic engineers for exclusive service to those concerned with development of power from water. Their basic knowledge of the hydraulic art, enriched by many years of intimate field experience, qualifies them to a degree not exceeded by any similar organization.

Pelton engineering competence is converted into economic assets by manufacturing facilities particularly suited to the building of hydraulic turbines, valves and other accessories, this supplementary service likewise being nowhere excelled for precision and thoroughness.

Within the past decade, marked improvements in design, materials and processes have been realized, these being of particular significance to the older plants which may be readily modernized for higher efficiency, greater dependability and safety, at small cost. Consult Pelton engineers to obtain the utmost from existing or proposed water developments.

THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

120 Broadway, New York
2929 Nineteenth Street, San Francisco
Paschall Station, Philadelphia

Western Representatives for Baldwin-Southwark Corp., Cramp Brass & Iron Foundries Co., Woodward Governor Co., Carbondale Division of Worthington Pump & Machinery Co., and Cone Valve Division, Chapman Valve Manufacturing Co.

PELTON

STEEL STRAND ◆ TELEPHONE WIRE

Crapo

GALVANIZED PRODUCTS

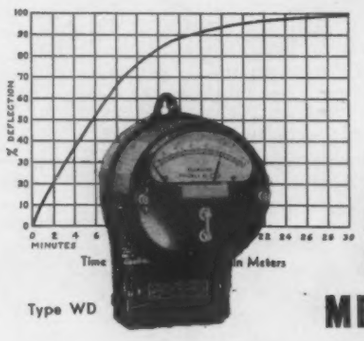
SPECIFIED BECAUSE OF PROVED PERFORMANCE

Crapo Galvanized Steel Strand has earned its enviable reputation for long, dependable, economical life by outstanding performances in actual service. That's why it so often is specified by leading utilities for the more important construction jobs. The heavy, uniform, pure zinc coating—applied by the *Crapo* Process—is notable for its adhesion and ductility; its ability to withstand bending and twisting; its lasting resistance to corrosion. Both the finished strand, and the wire from which it is made, conform in every detail to the most rigid specifications for tensile strength, elongation, size, galvanizing and ductility.

Crapo Galvanized Strand is readily available in all standard grades and sizes. Ask your Jobber, or write direct for technical details!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

LINCOLN DEMAND METERS



Time Response of Lincoln Meters

Type WD

Independent OF TIMING MECHANISMS

The above curve shows the time required to reach any percent of a steady load maintained for any given length of time. This time lag is inherent in the construction of Lincoln Meters and is due to the heat storage capacity of the material used.

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LINCOLN METER COMPANY
SPRINGFIELD, ILLINOIS

ABOUT PEOPLE

Merrill Named President of Mountain States Power

Z. E. Merrill, former vice-president in charge of operations of the Mountain States Power Co., has been elected president of the company. He succeeds C. M. Brewer.

Active in the Northwestern utility field since 1906, Mr. Merrill has been with Mountain States Power for fifteen years. He held the position of assistant general manager until 1931 when he was made vice-president.

Z. E. MERRILL

Mr. Brewer, who is also president of California-Oregon Power Co., will retain that position as well as his seat on the board of the Mountain States Co. ●

Development League Officers Take Up Duties

Ross Hartley and Graham Holabird last month took over duties as president and vice-president of the Electrical Development League of Southern California. Working with them were William E. Cranston, Jr. and F. L. Hockensmith, re-elected treasurer and general manager.

New board of trustees of the organization comprises: H. D. Alshuler and E. L. Williams, representing electrical appliance distributors; Herbert L. Evans and Sidney F. Hill, contractors; Mr. Hartley and Burrell S. Manuel, wholesalers; Mr. Cranston and A. A. Schueler, manufacturers; Burdett Moody, E. V. Kane, P. Diederich, W. C. McWhinney and Henry C. Rice, public utilities; K. S. Long and W. G. McWhinnie, dealers, and Mr. Holabird and Ira R. Seltzer, manufacturers' agents.

Committee chairmen are: R. E. Smith, finance; A. E. Hitchner, president in 1937, membership; H. D. Conklin, domestic appliance; S. L. Cipperly,

One reason why range users like

CHROMALOX

***Super-Speed* RANGE UNITS**

For small pans, turn the switch to medium, and heat the small inside unit only—what can be simpler than that?

Another thing—for ideal frying heat, use the large, outside unit only, and avoid excessive heat in the center of the pan.

Features like these help you sell Chromalox-equipped ranges. Why not take advantage of them?

Our nearest representative will be glad to work with you.

EDWIN L. WIEGAND CO.
PITTSBURGH, PA.
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MONTGOMERY BROTHERS
911 Western Ave., Seattle, Wash.
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61 Fremont St., San Francisco, Calif.
912 E. Third St., Los Angeles, Calif.
THE PETERSON COMPANY
1921 Blake St., Denver, Colo.

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Our Agency Service has five outstanding advantages for anyone having a sizeable investment portfolio:

1. It relieves the client of all bookkeeping details and annoying routine.
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3. It provides records helpful in preparing tax returns.
4. Its cost is moderate — frequently it pays for itself.
5. Flexible, it is adapted to the client's individual needs and operates under his direct authority.

TRUST DEPARTMENT

CROCKER FIRST NATIONAL BANK *of San Francisco*

commercial cooking and baking; H. D. Easterbrook, industrial power and heating; Frank J. Airey, adequate wiring; H. H. Douglas, air conditioning, and Frank A. Hansen, commercial and industrial lighting.

●

JUDSON E. HOLLAND has been appointed general manager and assistant to the executive vice-president of the Pacific Electric Mfg. Corp. Mr. Holland has been with the company since 1916. He is succeeded as superintendent by F. A. M. Jones.

●

HARRY H. DALEY, formerly in charge of the General Electric Supply Corp.'s lamp department and later a sales executive of the Majestic and Thermador lines, has been named in charge of the home and gardens division of the Golden Gate International Exposition.

●

V. H. MOON, formerly sales manager for Pacific Power & Light Co. and more recently vice-president of the Middle West Service Corp., has been named vice-president in charge of business development for Central Service Corp., Chicago.

●

ARMINGER F. DREDGE has joined the staff of W. Harry Archer & Associates, San Francisco consulting and industrial engineers.

●

WALTER W. R. MAY

WALTER W. R. MAY, former newspaper man and lately manager of the Portland Chamber of Commerce, has been named to the newly created position of director of industrial development for the Portland General Electric Co.

●

W. H. VARLEY, formerly connected with the Associated General Contractors, has been appointed business representative and contact man for the San Francisco Electrical Contractors' Assn.

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Sangamo Type HFS Socket Meter

MODERN METERS

Sangamo Type HFA Conventional Service Meter

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1938 SUPER-SERIES

Standard ELECTRIC RANGES

with new improved

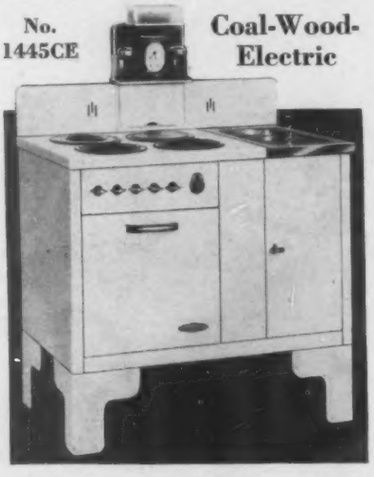
KALMAX Burners and the EVEN-OVEN

● Brilliantly modern styling . . . one-piece tops with rounded corners . . . one-piece lighted ovens with recessed burners . . . fully automatic. New improved KALMAX surface burners, and the high-efficiency EVEN-OVEN. The finest ranges in Standard's long history.

No. 1540 "Capitan"

Typical of the ten new Super Series Standards for 1938. . . Standard originated all modern electric cooking features.

No. 1445CE Coal-Wood-Electric



For the rural or hard-to-heat kitchen. A complete electric range with soft coal or wood burning section to take off the chill. Has all Standard advantages plus this added convenience.

Distributors and dealers are invited to write for information on new 1938 Super Series Standard ranges and water heaters . . . or use coupon below.

●

The Standard Authorized Dealer or Distributor franchise gives you important special advantages.

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Toledo, Ohio W3
Please send information on following
( ) Super Series Standards for 1938
( ) Standard Water Heaters
( ) Authorized Dealer Franchise
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.....
.....

Portland Electric Club Elects Millard Sebern

Millard Sebern, Fowler Mfg. Co., Portland, has been elected president of the Portland Electric Club succeeding George H. Wisting.

Other officers are: L. W. Going, chief electrical inspector, City of Portland, first vice-president; W. R. Grasle, W. R. Grasle Co., second vice-president; S. G. Ward, Graybar Electric Co., secretary; A. M. McLean, Department of Vocational Education, treasurer, and George E. Kelley, Portland G. E., sergeant-at-arms. F. Earl Davis and Leonard Kallen are directors.

●

V. T. RUPP

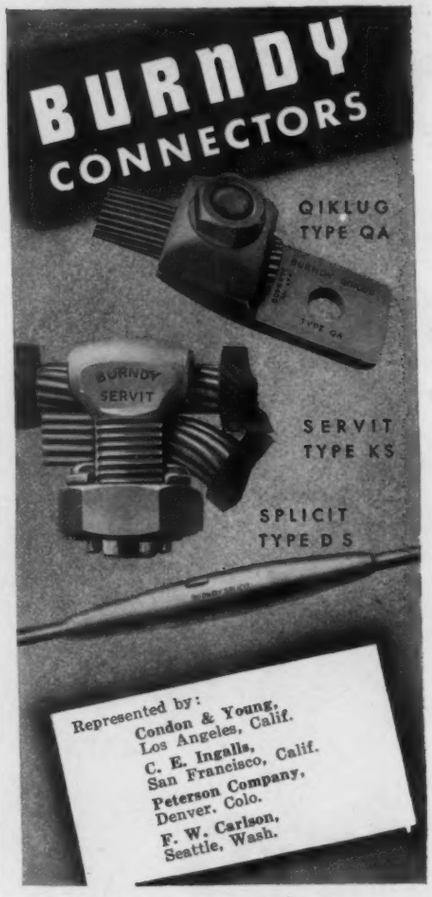
V. T. RUPP, in charge of the supervision of Burgess Battery Co. sales in the eleven Western states since 1929, has gone into business as a manufacturer's agent in the southern California area. In addition to continuing as representative for the battery company, he will acquire several new lines. Offices are located at 1101 W. Olympic Blvd., Los Angeles.

●

FIVE MEN HAVE BEEN named district superintendents by Pacific Power & Light Co. They are W. L. Kirkman, Deschutes district; J. S. Bates, Yakima; J. T. Holbrook, Dalles-Hood River; J. W. Childers, Walla Walla-Walla Walla River, and J. O. Swanson, Pasco-Lind-Hanford. V. L. Carlson has been transferred from Bend to Union Gap as chief operator.

●

THIRD PRIZE WINNER in the 1937 national rural electrification contest sponsored by Westinghouse Electric & Mfg. Co. was nineteen-year-old Edward Weston, Tillamook, Ore., who put his hobby of electricity to work and captured a $200 scholarship to Oregon State College. Miss Cecil Kuydendall, Arizona, was awarded one of seven sectional prizes.



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On Pole Line Hardware Assures Satisfaction

KORTICK

Manufacturing Company

Executive Offices, Plant & Main Warehouse:
345 First St., San Francisco, Calif.

Complete Warehouse Stocks at
PORTLAND ● LOS ANGELES ● SEATTLE

W. H. Ude Succeeds Col. Thomas G. Aston

W. H. Ude, director of customer relations for the Washington Water Power Co., has been named to succeed Col. Thomas G. Aston, company claim, tax and right of way agent who died late in December of pneumonia. Mr. Ude has been with the company since 1923.

UDE

CROSBY

Also appointed to a new position is E. J. Crosby, assistant to Mr. Ude for the past ten years. He has become manager of the newly created personnel department, an outgrowth and substitute for the customer relations department.

●

WILLIAM J. COTTRELL, formerly Portland manager for Allied Industries, Inc., has been made district manager of Maydwell & Hartzell's new Northwest district office, 733 NW. Everett St., Portland.

●

B. D. MOSES, associate professor of agricultural engineering at the University of California College of Agriculture, Davis, has returned from a six-months' study of rural electrificaton in the east. Prof. Davis spent most of his time at the General Electric plant, Schenectady, working on adaptation of electricity to farm uses.

●

ROMAINE W. MYERS, Oakland electrical engineer, and designer of the lighting system for the Broadway low-level tunnel connecting Oakland and Contra Costa County, conducted the Illuminating Engineering Society, San Francisco Bay Cities' Section, on a tour of the tunnel, Jan. 14.

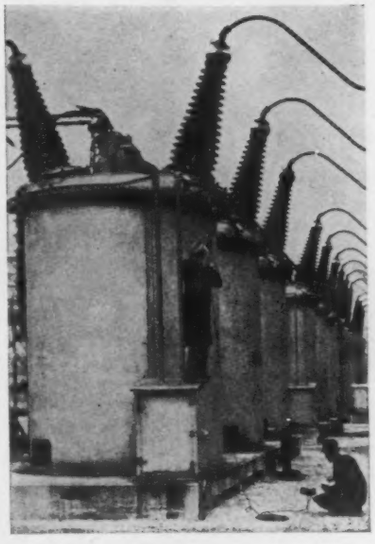
●

JOSEPH E. SCHUMACHER has been named by Mayor Frank L. Shaw to succeed Dr. John R. Haynes as a member of the Los Angeles Board of Water and Power Commissioners. Mr. Schumacher is one of the founders of Schumacher Wall Board Corp.

●

ARTHUR JOHNSON has been appointed sales manager of the flood light division of the S. & M. Lamp Co.; Ray Fox, sales manager of the automotive and marine division.

The ROLLER-SMITH "HIPOT" INSULATOR TESTER



Provides the quickest, safest, most accurate, most reliable and most economical

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method of testing circuit breaker and transformer bushings and sectional insulators for potentials up to 220 KV.

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The story is told very clearly by an Engineer of one of the World's largest Power Companies in an article presented by him at a recent AIEE meeting.

Send for this article and Catalog P-11, Section 2.

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GARDNER TRANSFORMERS

To assure uninterrupted service and greater protection for motorists using the new Broadway Low Level Tunnel which connects Metropolitan Oakland with Contra Costa County, Gardner Transformers were used exclusively. Under the direction of Romaine W. Myers, consulting engineer of Oakland, the Alta Electric and Mechanical Company, San Francisco electrical contractors, installed the following Gardner Transformers which included specially constructed, high efficiency dry type transformers*, designed especially to meet the rigid specifications of this job:

6— 75 kva. oil cooled distribution transformers single phase
6— 10 kva. oil cooled distribution transformers single phase
2— 3 kva. oil cooled distribution transformers single phase
*16—4½ kva. dry type 3 phase transformers
2—7½ kva. dry type 3 phase transformers
5—4¼ kva. dry type single phase transformers
All 2300 volts.

Solve your transformer problem by calling our nearest representative

GARDNER ELECTRIC MFG. CO.
4227 Hollis Street Emeryville, California

REPRESENTATIVES: Geo. E. Henn Co., 420 Market St., San Francisco, Calif.; Utilities Supply Co., 1736 E. 15th St., Los Angeles Calif.; Industrial Electric Co., 1304 Stewart St., Seattle, Wash.; Modern Electric Co., 37 Richards St., Salt Lake City, Utah; Kranefeld Engineering Co., 3416 14th Ave., Denver, Colo.

F. HARPER CRADDOCK, assistant chief of the REA rate section, has been raised to the rank of chief, succeeding H. Zinder. Mr. Craddock was formerly chief engineer of the State of Washington Department of Public Works and was employed as valuation and rate engineer by several Northwest utilities.

●

A. B. WEST, president of Nevada-California Electric Corp., was one of a group of utility leaders who conferred with President Roosevelt last month on the duplication of power facilities, particularly in relation to present developments on the All-American Canal and the Brazos and Lower Colorado Rivers in Texas.

●

New Officers Take Over L. A. Ben Franklin Club

Will H. Davie, president of Allied Industries, Inc., last month took up new duties as president of the Ben Franklin Club, Los Angeles. He succeeded M. L. Fowler.

Taking office at the same time were S. P. Larsen, Hubbard & Co., first vice-president; A. A. Schueler, Square D.

WILL H. DAVIE

Co., second vice-president, and Graham Holabird, National Electric Products Corp., secretary-treasurer. Directors are Mr. Fowler, Benjamin Electric Mfg. Co.; E. H. Bell, Associated Sales Engineers; H. D. Burns, Bryant Electric Co.; I. R. Seltzer, Henger-Seltzer Co., and A. G. Von Norman, Trumbull Electric Mfg. Co.

Mr. Davie, who has served on the board of directors of the club since its organization, joined Allied Industries in 1924. He became president of the company in 1935 upon the death of W. S. Greenfield.

New program for the club calls for only one night meeting a month. Formerly meetings were held at noon.

CHARLES N. WILLARD, formerly of Los Angeles, has joined the Rocky Mountain staff of the Edison General Electric Appliance Co.

●

M. P. HOTELLING, chief electrical technician of the Washington State Electrical Inspection Dept. for the past two years, has returned to his former post in the electrical inspection division of the Seattle Building Dept.

●

GEORGE A. BIHLER, superintendent of lines and service for Utah Power & Light Co.'s Bingham division since 1923, has been promoted to the managership of the division. He succeeds the late J. B. Myers.

●

HOW MOTION PICTURE STUDIOS employ lighting was seen by the Illuminating Engineering Society, Southern California Section, at its Jan. 11 meeting when it visited the RKO Studios. Welcomed home from a sojourn in England, where he had supervised movie lighting, was Bob Lindeman, former studio illuminating engineer in Los Angeles.

●

ARCHIE MARSDEN has been elected president of the Electric Club of San Diego succeeding A. Vern Engel. Walter Chapman is first vice-president; Emil A. Balle, second vice-president, and William J. Lainson, secretary-treasurer. New directors are Harvey K. Watt, Bart Murray, William H. McKinley and R. S. Ruffin.

●

COL. J. P. MACKENZIE has been elected chairman of Engineering Institute of Canada, Vancouver branch, succeeding H. N. MacPherson. C. E. Webb is the new vice-chairman and T. V. Berry secretary-treasurer. Named to the executive committee for two-year terms are Dr. Victor Dolmage, Ernest Smith and Archie Peebles.

●

Deaths

GEORGE R. WRIGHT, manager of the British Columbia division of the Canadian General Electric Co., since 1925, died at his home in Vancouver, Jan. 1. He was 55. A past president of the Electric Club and director of the Electrical Service League of B. C., Mr. Wright had been connected with the company since 1906.

●

DAVID FERNIE, 45, manager of B. C. Electric Railway Co.'s main showroom at Carrall St., Vancouver, died recently. He had been in turn a partner with his brother in the Okanagan Electric Co., Vernon, B. C.; manager of the electrical department of David Spencer, Ltd., Vancouver, and showroom manager for B. C. Electric since 1928.

●

BEN E. GOODSELL, 47, general superintendent of the Arizona Edison Co. from 1929 to 1935, died last month at a nephew's home in Seattle.

●

HARRY GENT, employee of the Washington Water Power Co. for 35 years, died in Spokane. He was in the meter and repair department.

●

HARRY J. WOODWARD, of the Harry J. Woodward Co., Seattle manufacturer's agent, died at his home Dec. 25 after a six-months' illness. He was 51.

●

WILLIAM H. MACDONALD, 53, master mechanic with the West Kootenay Power & Light Co., South Slocan, B. C., for the past 14 years, died at Nelson, B. C., after a year's illness.

●

CLARENCE SHINN, 44, Pacific Power & Light electric superintendent at Walla Walla, Wash., died last month of cerebral hemorrhage. He had been connected with the company since 1911.

Speakers

At a meeting, sponsored by the San Francisco Engineering Council, of six engineering societies in the San Francisco Bay Region—Dr. B. M. Woods, dean of engineering, University of California: The possibilities and developments of air conditioning"; Dr. M. N. Hosmer, University of California Hospital: "Physicians should know enough about air conditioning to be able to prescribe the proper conditions of air for their patients—engineers should be able to fill these prescriptions"; Prof. Walter Weeks, University of California: "Deep mine ventilation and the prevention of silicosis."

At the eighteenth annual meeting of the Professional Engineers Association of British Columbia—C. V. Brennan, president: the engineer's contribution to civilization.

At the Vancouver Institute in the University of British Columbia—W. C. Mainwaring, general sales manager, B. C. Electric Railway Co.: development of electricity.

At the January meeting of the Vancouver, B. C., Section, A.I.E.E.—D. C. Stephenson, Nanaimo-Duncan Utilities, and A. Miller, B. C. Telephone Co.: submarine cables.

At American Welding Society, San Francisco section, meeting—J. F. Lincoln, president of Lincoln Electric Co.: welding.

At the annual meeting of the Mountain States Hardware Assn.—F. H. Harrington of the Modern Kitchen Bureau.

C. A. RUSSELL, formerly manager of the merchandising division of Wesix Electric Heater Co., San Francisco, has been named general sales manager of the entire organization.

●

NORGE HAS ADDED the following specialty salesmen to its Northwest sales force: Perry West in Seattle, John Stumberg in Portland and F. N. Ashford in southern Oregon.

●

R. P. TOLLES, National Carbon Co.'s eastern division sales manager, has been transferred to the Pacific Coast division to succeed the late C. B. Clendenen.

●

W. C. MAINWARING, B. C. Electric Railway Co.'s merchandising manager, has been re-elected director of the Building & Construction Industries Exchange at Vancouver, B. C.

A. I. E. E. Convention Committeemen Named

Appointments to the convention committee for the A.I.E.E. Pacific Coast Convention to be held in Portland Aug. 9-12, 1938, were announced recently. Members of the Portland section who will assist General Chairman E. F. Pearson are:

D. F. Smith, vice-chairman; Corbett McLean, secretary; John Bankus, treasurer; Walter Brenton, meetings and papers; O. B. Coldwell, finance; Sidney E. Caldwell, registration; R. J. Davidson, hotel arrangements; Vernon B. Wilfley, inspection trips; Charles B. Carpenter, publicity; L. R. Elder, reception; A. H. Kreul, entertainment; J. C. Henkle, golf; A. L. Albert, student activities; Gwyn E. Bishop, transportation, and Mrs. J. F. Spease, ladies' entertainment.

●

FRANK MCLAUGHLIN, president of Puget Sound Power & Light Co., has been elected vice-president of the Seattle Chamber of Commerce.

●

MAJOR M. ANDERSON has been named in charge of Hotpoint refrigerator sales in the Pacific Southwest district. He was formerly connected with the General Electric Supply Corp. as a salesman.

●

RALPH J. CORDINER last month became manager of General Electric Co.'s appliance and merchandise department. He will be responsible for the company's entire appliance and merchandise operation, which includes four major divisions. Born in the Pacific Northwest, Mr. Cordiner has been commercial district manager of Pacific Power & Light Co., northwest manager of Edison General Electric Appliance Co., and Pacific Coast division manager of Edison G. E. Prior to his recent promotion he was assistant manager of G. E.'s appliance and merchandise department.

●

MRS. LORA MURPHY, former assistant in Utah Power & Light Co.'s Boise office, has become Boise home service supervisor. Robert A. Hogg, commercial representative in Boise, is the new sales supervisor for the town.

●

J. C. DILLINGHAM has been appointed district manager of the San Francisco division of the General Electric Wiring Materials field organization.

●

DUDLEY B. WHEELOCK, assistant general commercial manager for Nevada-California Electric Corp., has been elected director of the Riverside Chamber of Commerce.

PROFESSIONAL SERVICES

ELECTRICAL TESTING LABORATORIES

Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory.

80th St. and East End Ave., New York

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Where will it leave you next December? A clear picture of what to look for — definite, concise interpretations of economic trends and prospects— is in the annual

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● Send this advertisement and One Dollar for this Forecaster plus a Special Report on "Why Renewed Progress of the Business Cycle Should Follow the 1937 Interruption."

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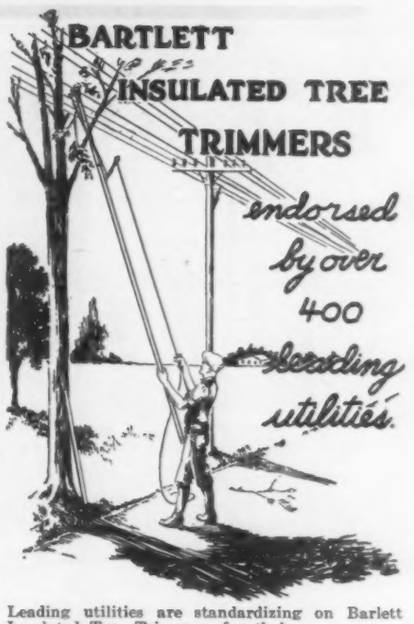

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SAFETY—tested to withstand 105,000 volts.

EFFICIENCY—compound lever cutting head easily snips branches up to 1¾ inches.

STRENGTH—shellacked airplane spruce poles and finest tool steel forgings insure ample strength and long service.

These are sound reasons why utilities everywhere choose Bartlett Tree Trimming Tools. Complete information on request. Ask for Catalog No. 23.

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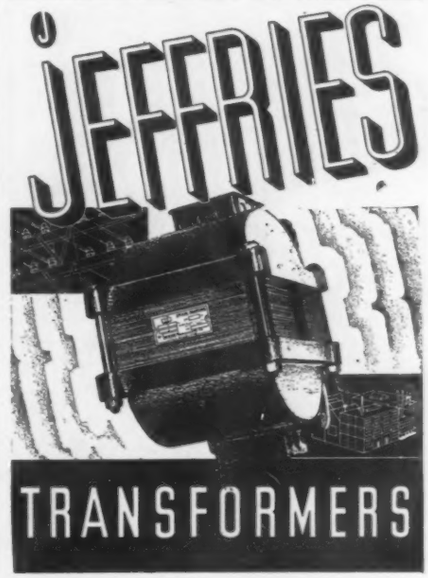
Pacific Coast Representative



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2. Saving in power rate.

(Put all of your 110-volt equipment on a 220-volt or 440-volt power circuit, it is economical.)

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GEO. E. HONN CO.

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★ *Reliable Products*

★ *Local Stocks*

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- GARDNER ELECTRIC MFG. CO. *Power and Distribution Transformers*
- LEE SKIPWITH & CO., INC. *Niagara Air-Insulator Current Transformers*

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- KELLEMS PRODUCTS, INC.

GROUNDLINE POLE TREATMENT
- OSMOSE CORP. OF AMERICA

CONNECTORS, GROUND ROD CLAMPS, UTILITY HOISTS
- JASPER BLACKBURN PRODUCTS CORP.

METERING INSTRUMENTS
- LANDIS & GYR, INC.

NEON MULTIPLE PLUG FUSE
- PACIFIC INDICATOR CO.

FUSES, CUTOUTS, PROTECTIVE DEVICES
- SCHWEITZER & CONRAD, INC.

UNDERGROUND TOOLS & EQUIPMENT
- T. J. COPE INCORPORATED

CAPACITORS
- CORNELL-DUBILIER CORP. *World's Largest Exclusive Mfrs. of Capacitors*

THE SAFE ANCHOR FOR R. E. A. CONSTRUCTION!

For long life and economy in annual maintenance cost, Everstick Anchors are first choice in rural electrification construction. Their safety and dependability have been proven on millions of miles of electric lines.

ANCHORS FOR EVERY PURPOSE

The complete line of Everstick Anchors offers three expanding types in a complete range of sizes and holding capacities. Also rigid type Cone Anchors in all sizes. Made of malleable iron with its properties of strength, elasticity and rust resistance. Write for new bulletin "Everstick For Rural Electrification."

The **Everstick Anchor Co.** ☆ FAIRFIELD, IOWA

MAYDWELL

Glass Insulators

All Standard Numbers For All Purposes

Made of high quality materials in a modern Pacific Coast plant producing an unusually tough glass to withstand all severe service conditions.

MAYDWELL & HARTZELL INCORPORATED

Electrical Engineers and Manufacturers' Representatives

San Francisco Los Angeles Portland

WALTER E. TRITTIPO has been appointed mid-western sales manager for Proctor Electric Co., Philadelphia. Mr. Trittipo, who for the past year has covered the Chicago territory for Proctor, now extends his supervision over the whole central part of the country bounded by Denver, Pittsburgh and New Orleans.

●

HUGH V. BROWN has been appointed a one-man coordinating committee for the Sight Conservation Council of Northern California. He will assist societies, clubs and welfare groups attempting something in the line of sight conservation to organize a constructive program.

●

CRAIG P. ELIOT of the West Coast Power Co., Portland, has been transferred to Hailey, Ida., as division manager.

●

JOHN A. MANGAN, formerly connected with Bryant Electric Co., has joined the sales staff of Meyers Safety Switch Co., San Francisco.

●

E. VELTE, former range and refrigerator salesman in Portland, has been made manager of Wolf Electric Co., Vancouver, Wash.

●

LESTER R. JOHNSON, formerly connected with the sales staff of the Northern States Power Co., is the new manager of the electric range department of Montgomery & Ward, Spokane.

●

A. PEDERSEN has purchased full title to the Transmission Engineering Co., manufacturers' representative organization operating in northern California. New offices of the company are in the Rialto Bldg., San Francisco. Among the accounts represented are the Falk Corp. of Milwaukee and United Iron Works of Oakland.

●

CAPT. H. F. JACKSON, former president of the Sierra & San Francisco Power Co., which later merged with the Pacific Gas and Electric Co., has been appointed manager of the San Francisco office of the Biddle Trade Bureau, with George Eldridge as his assistant. Captain Jackson has for the past few years been connected with the American and Foreign Power Corp.

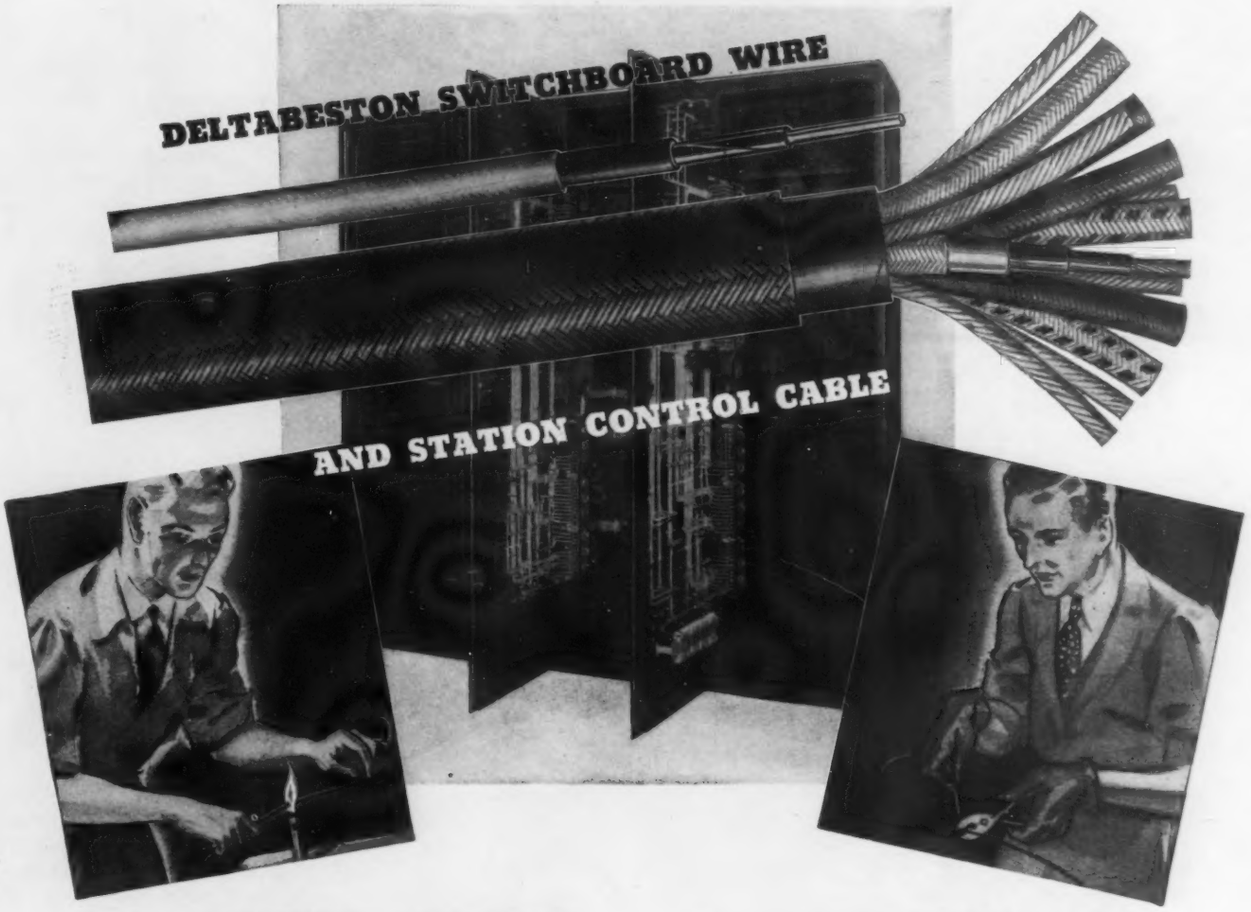
●

CLARENCE VACHER, formerly connected with the Utah Power & Light Co.'s commercial sales department in Provo, has been appointed commercial sales supervisor of the Ogden division.

●

WILLIS E. BARNUM of the Los Angeles office of the York Ice Machinery Corp. has become head of the company's air conditioning division.

FOR *Extra Special* SERVICE



● PURIFIED ASBESTOS FOR HEAT RESISTANCE

There's just one way to insure dependable switchboard service. Install wire and cable that will carry on, regardless of treatment of environment. That means switchboard wire and control cable insulated to resist flame, severe heat and moisture. It means, in short, Deltabeston.

Ordinary insulation fails when confronted with high temperatures or fire from an outside source. *Not Purified Asbestos!* This exclusive Deltabeston insulation is built to stand up under abnormal treatment — laugh at high temperatures!

● FELTED INSULATION ELIMINATES CRACKING

Deltabeston construction results in wire of uniformly small diameter. Felted insulation eliminates cracks and breaks, even when it is bent at sharp angles. Installations are neater — service is safe and lasting.

A complete line of Deltabeston Wire and Cable is distributed by General Electric Merchandise Distributors and Graybar Electric Company. For helpful bulletins and samples write to Section Y-8212, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

DELTABESTON WIRE AND CABLE

APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT

TRADE NOTES

NEW KELVINATOR FACTORY BRANCH, designed to handle only electrical household appliances, has been opened at 1027 N. Highland Ave., Los Angeles. Manager of the branch is T. J. McIntire assisted by M. N. Kefete, accountant and office manager, and J. J. McQuade, credit and collection.

●

READ R. SMITH has resumed his radio and electrical merchandise business in the Ogden, Utah, store recently bought by J. C. Penny Co. The store was formerly known as the Wright Store.

●

PURCHASES OF ELECTRICAL EQUIPMENT valued at $9,907,007 were among the nearly one-half billion dollars worth of materials, equipment and supplies bought for Works Progress Administration projects during the first 26 months of operation, the WPA Division of Research, Statistics and Records announced last month.

●

FIRST INTERNATIONAL BROADCAST shortwave radio transmitter west of the Mississippi River will be built by General Electric Co. at Belmont, Calif. The station, operating on two frequencies now assigned to the company —9,530 kilocycles and 15,330 kilocycles—will be equipped with latest type directional antennas with beams directed to the Far East and South America. Completion of the station is scheduled for late next year.

●

TO IMPRESS POTENTIAL BUYERS with the longevity of the machine, Howell Electric, Inc., Reno, ran a G. E. cleaner continuously for more than fifteen days and gave a free cleaner to the person most nearly estimating its operating life. A worn-out brush was the only reason for the display's stopping.

●

PROVISION OF A NEW and practical source of "Black Light", or ultra-violet light, has given renewed impetus to the use of spectacular effects with luminescent paint and pigment. Science Laboratories, Inc., 424 E. Fourth St., Cincinnati, has announced the new "Sperti Black Lamp 200". This is designed to operate at 110 volts, 60 cycle alternating current in any position and may be flashed on and off. It reaches maximum efficiency in fifteen seconds and is claimed to start and operate in either extreme heat or cold. Listed retail price is $9.50.

FRIGIDAIRE'S NEW LINE of ranges, water heaters, washers and ironers will find its way into the Northwestern market through distribution by Sunset Electric Co., Seattle and Portland, for several years distributor of Frigidaire refrigerators. In making way for the new appliances, Sunset dropped the L & H line of ranges. This is now being handled by Electrical Distributing Co., Portland.

●

CLARENCE R. HUNT, San Francisco and Los Angeles, and Gillette & McLaren, Portland and Seattle, have been named representatives in their respective regions for Durakool, Inc., manufacturer of Mercury switches.

●

Henger-Seltzer Building

Several features of Henger-Seltzer Co.'s new headquarters at 130 South Hewitt St., Los Angeles, make the building one of the most modern distributing centers in that area.

An inclined loading pit, which brings trucks on a level with the loading platform, plus an overhead crane system reaching into any part of the 20,000 sq. ft. building enables the staff to load trucks almost entirely by machinery.

Another time and energy saving convenience is a cable reel rack holding over 200 reels of rubber-covered and rubber and lead cable. A measuring machine mounted on a hand truck can be run in front of any reel from which material is desired.

Manufacturers represented by Henger-Seltzer, which handles construction lines to southern California wholesalers, include Crescent Insulated Wire & Cable Co., Trenton, N. J.; The Steelduct Co., Youngstown, Ohio; Steel City Electric Co., Pittsburgh; Killark Electric Mfg. Co., St. Louis; Heinemann Electric Co., Trenton; P. R. Mallory Co., Indianapolis, and the Bridgeport Brass Co., Bridgeport, Conn.

●

ARIZONA EDISON CO., INC., has been added to the list of Western utilities using the Reddy Kilowatt "Electrical Servant" trademarked character.

●

LONGLEY ELECTRIC CO., LTD., electrical equipment store, has been incorporated at Victoria, B. C. Registered address is 1236 Seymour St., Vancouver, B. C.

MR. AND MRS. FERRON L. MINER have opened a new electric appliance store, the Miner Appliance Shop, at American Fork, Utah. The store handles the usual line of appliances and offers a wiring service.

●

EDWARD J. MOREAUX, formerly store manager, has bought the All-Electric Co., Salt Lake City, and changed the name to the All-Appliance Co.

●

GRANITE FURNITURE CO., Salt Lake City, has opened a branch store at Provo, Utah. A complete line of appliances is carried.

●

WESTINGHOUSE REFRIGERATOR and other major appliance business has been taken over by the San Francisco office of the Westinghouse Electric Supply Co. from Colvin-Templeton Co., San Francisco.

●

THOMPSON-HOLMES CO. has been appointed northern California distributor for Stewart-Warner refrigerators and radios. The line was formerly carried by Moore Electric Supply Co.

●

NIELSEN FURNITURE CO., Montpelier, Utah, will open a complete appliance store in the building now occupied by Skaggs Safeway. The company was one of the first to become part of the national dealer organization of Bendix Home Appliance Corp.

●

BUZZELL ELECTRIC WORKS, San Francisco engineers, contractors and dealers, has been appointed dealer distributor for Square D Co.'s industrial control equipment.

●

METER READERS of Puget Sound Power & Light Co.'s Central division have instituted a series of dinner meetings at which problems and methods of improving their work are discussed. At each conference a selected meter reader talks on the phase of the work which most interests him.

●

Moved

BETTS ELECTRIC, Penticton, B. C., to new store in the Mitchell Block, Penticton.

STATE APPLIANCE SERVICE from 1151 Santee St., Los Angeles, to new and larger quarters at 451 E. Fourth St.

B. L. RUSSELL, General Electric dealer, from 6732 Pacific Blvd., Huntington Park, Calif., to new store at 7028 Pacific Blvd.

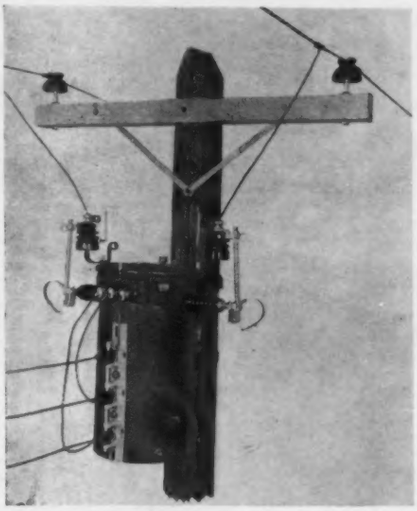
ROY THOMAS CO., electric jobbers and distributors, from 1224 S. Hope St., Los Angeles, to new building at 1611 S. Hope St.

WALTER WEST ELECTRIC CO., Los Angeles contractor, to 4973 W. Adams Blvd.

NEW PRODUCTS

Distribution Transformer

A new distribution transformer with primary bushings, fuse clips, fuses and horn-gap lightning arrestors mounted on the case is offered by Wolff Electric Works, Portland. The Matthews standard fuse cartridge is furnished with this unit. The transformer can be mounted directly on the pole with band metal clamps



without the use of crossarms. A bracket with strain insulators for the secondary leads is mounted vertically under the secondary bushing. Both primary and secondary connections are made to screw clamps which are tightened with a wrench. Manufactured in sizes 1½ to 50 kva. with standard primary voltage ranges from 7,200 to 22,000 and with all standard secondary voltages, the transformer is said to be responsible for substantial savings in installation costs.

●

Woolwine Ranges

A fan-type, timer-controlled electric kitchen heater which can be installed in place of a range utility drawer is the chief talking point of Woolwine's new "econo-lectric" ranges. Other points include: Fuse on appliance outlet can be changed by removing one of utility drawers instead of pulling range away from wall. Pigtail can be disconnected by removing utility drawer. A selector switch has been added to the oven control, thus permitting quick preheating, broiling or baking. Oven lining is welded to the front frame and both are enameled as one piece. The 1000-watt surface unit has been changed to a 600-watt for simmer heating.

●

Exposure Meter

New, compact exposure meter for use in taking either still or motion pictures under all sorts of conditions has been introduced by General Electric Co. Outstanding feature of the instrument is a hood which limits the angle of light received to approximately that of a camera. In addition, the hood is provided with a hinged, slotted cover which, when opened, increases the sensitivity of the meter by 10 to 1. With hood removed the instrument can be used as a light meter for checking home or office illumination.

●

Spinner-Type Washer

The Whirlwind marks Blackstone Mfg. Co.'s entrance into the spinner washer field. Tubs are bullet-type. Metal parts are "bonderized" for protection against rust and corrosion. Mechanism, simplified to contain 25 per cent fewer parts, is multiple-driven.

●

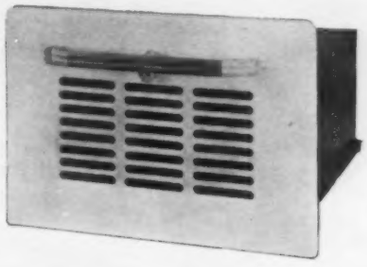
Dust-Tight Capacitors

Dust-tight capacitors, consisting of the capacitor unit proper, dust-tight terminal compartment and mounting supports are being manufactured by Westinghouse, especially for use in mills and plants. Several capacitors may be placed side by side, 1 in. apart, connected with 1½-in. conduits, using side knockout holes. Thus units can be installed and removed from the terminal enclosure without disturbing conduit connections. Available are 5 and 7½-kva., 230-volt, and 5, 10 and 15-kva., 460 and 575-volt units.

●

Color-Blend Lighting

Color-Blend is the name of a new machine which permits a blend of three colors with no stops or flashes between changes. Introduced by Lockwood Electric Co. for use in lighting show-windows, theater marques, convention exhibits, etc., the device has for its basic principle a multi-volt transformer.



Changes of colors are automatically timed at the rate of 60 sec. to each color or a 3-min. interval for the complete 3-color cycle. This is standard; however, variable timing is also possible. Current-consumption is said to be reduced by the machine 33⅓ per cent.

●

Washers

Dexter has brought out two washers, the Thriftwin twin tub and Defender single tub. The models feature sealed-in forced-feed oiling system and automotive transmission.

PRODUCT DATA

201:
TRUCK BODIES AND TRAILERS for all electrical purposes described in loose-leaf catalogue. Baker-Raulang Co.

202:
RECORDERS FOR ELECTRICAL UNIT MEASUREMENTS; operating characteristics and various applications described. Bristol Co.

203:
SERVICE ENTRANCE CONNECTORS for house service connections and other small solderless wire connections illustrated and described in leaflet. W. N. Matthews Corp.

Free to you . . . Any of these instructive bulletins . . . Address a post card to ELECTRICAL WEST 883 Mission St., San Francisco, Calif. . . . drop it in the next mail.

204:
ANTI-VIBRATION METHODS and products described and illustrated in "Smoother Sailing with Korfund" Co. booklet.

205:
SEPARATOR MAGNETS for removal of tramp iron from conveyor systems; complete but brief treatise. Electric Controller & Mfg. Co.

205:
RECORDING THERMOMETERS; 40-page catalogue giving brief story of value of thermometers and separate descriptions of the various types. Foxboro Co.

206:
PISTON RINGS; various types and their applications described. Auto-Diesel Piston Ring Co.

207:
SAFETY SWITCHES, meter switches, service equipment, panel boards, lighting equipment, switch boards and miscellaneous equipment catalogued. Meyers Safety Switch Co., Inc.

208:
MICROMAX TEMPERATURE INSTRUMENTS for steam plants; catalogue showing how temperature measurements help to effect operating economies, describing three methods of measurement, listing equipment. Leeds & Northrup Co.

209:
C-D BOX-TYPE CAPACITORS; mounting and constructional features described and illustrated. Cornell-Dubilier Electric Corp.

210:
NEW LUMINAIRE for lighting stores briefly described. Westinghouse Electric & Mfg. Co.

211:
VERTICAL MOTORS, hollow and solid shaft polyphase, ball-bearing, squirrel-cage, induction type, described. Fairbanks, Morse & Co.

WHERE TO BUY IN THE WEST

Air Conditioning
Frigidaire Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Kelvinator Corp.
Norge Division, Borg-Warner Corp.

Ammeters and Voltmeters
Ferranti Elec., Inc.
General Elec. Co.
Roller-Smith Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instr. Corp.

Anchors, Guy
A. B. Chance Co.
Everstick Anchor Co.
Hubbard & Co.
James R. Kearney Corp.
W. N. Matthews Corp.

Anchor and Guy Rods
A. B. Chance Co.
General Elec. Co.
Hubbard & Co.
Maydwell & Hartzell, Inc.

FERRANTI CLIP-ON AMMETER

Measures Loads Instantly!

Used on bare or insulated conductors, the Clip-On Ammeter quickly measures loads on feeders, switches, motors, transformers—without interruption to equipment under test.

Useful, too, in determining the balance on three-wire systems or three-phase circuits, accurately and safely.

RANGES	
0-7.5/75	amperes
0-10/50	"
0-15/75	"
0-20/100	"
0-25/150	"
0-50/250	"
0-100/500	"
0-100/1000	"
0-200/1000	"
0-300/1500	"

Send for descriptive bulletin

FERRANTI ELECTRIC, INC.

30 Rockefeller Plaza New York City

Appliances, Household
Chicago Flexible Shaft Co.
Easy Washing Machine Corp.
Edison General Elec. Appliance Co., Inc.
Frigidaire Division
General Elec. Co.
General Elec. Supply Corp.
Graybar Elec. Co., Inc.
Kelvinator Division
Leonard Division
National Enameling & Stamping Co.
Noblitt-Sparks Industries, Inc.
Norge Division
Standard Elec. Mfg. Corp.
The Silex Co.
Utility Electric Co.
Thermador Elec'l Mfg. Co.
Wesix Elec. Heater Co.
Westinghouse Elec. Supply Co.
The Woolwine-Norris Corp.

Boxes
General Cable Corp.
General Elec. Co.
Superior Switchboard & Devices Co.

Brackets, Wood
Locust Pin Co.

G.C.A.
Lamp Replacers
Lamp base Removers
Cartridge Fuse Tongs
Switch Hooks

Send for Catalogue

We have been making safety tools for 30 years

The G. C. A. Manufacturing Co.
Pittsfield, Mass.

Breakers
Air Circuit Breakers
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General Elec. Co.
I-T-E Circuit Breaker Co.
Roller-Smith Co.
Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.
Oil Circuit Breakers
Allis-Chalmers Mfg. Co.
Electric Material Co.
General Elec. Co.
Pacific Elec. Mfg. Corp.
Roller-Smith Co.
Westinghouse Elec. & Mfg. Co.
Line Material Co.
Pacific Elec. Mfg. Corp.

Bus Fittings
Burndy Eng'g Co.
General Elec. Co.

Buses
Aluminum Co. of America

Bushings
General Elec. Co.
Lapp Insulator Co., Inc.
Locke Insulator Corp.
Ohio Brass Company
Westinghouse Elec. & Mfg. Co.

Cable Accessories
General Cable Corp.
General Elec. Co.
John A. Roebling's Sons Co.

Cables
Aluminum Co. of America
American Steel & Wire Co.
Columbia Steel Co.
Crescent Ins. Wire & Cable Co.
Crucible Steel Co. of America
General Cable Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Hazard Ins. Wire Works
Indiana Steel & Wire Co.
Maydwell & Hartzell, Inc.
The Okonite Co.
Okonite-Callender Cable Co.
Providence Insulated Wire Co.
John A. Roebling's Sons Co.
Triangle Conduit & Cable Co., Inc.
United States Steel Corp.
Westinghouse Elec. & Mfg. Co.

Carbon Brushes
National Carbon Co., Inc.
Union Carbide & Carbon Corp.

Carbon Products
National Carbon Co., Inc.
Union Carbide & Carbon Corp.

Chimes
Square D Co.

Clamps, Ground
B. Hartman
Reliable Elec. Co.

Clocks, Program
Tork Clock Co., Inc.

Coffee Makers
The Silex Co.

Coil Winding
Jeffries Transformer Co.

Commutator Dressers
Ideal Commutator Dresser Co.

Compounds, Insulating
Clifton Mfg. Co.
John C. Dolph Co.
General Cable Corp.
General Elec. Co.
Irvington Varnish & Insulator Co.

Condensers, Electric
Allis-Chalmers Mfg. Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Conduit
Aluminum Co. of America
General Elec. Co.
Triangle Conduit & Cable Co., Inc.
Youngstown Sheet & Tube Co.

Conduit, Flexible Metallic
General Elec. Co.
Triangle Conduit & Cable Co., Inc.
Wiremold Co.

Conduit, Underground
Johns-Manville Corp.

Connectors
Burndy Eng'g Co.
Electric Power Equip. Corp.
G & W Elec. Specialty Co.
James R. Kearney Corp.
W. N. Matthews Corp.
Reliable Elec. Co.
L. W. Thompson

Controllers
Allis-Chalmers Mfg. Co.
Betts & Betts Corp.
General Elec. Co.
Square D Co.
Ward Leonard Elec. Co.
Westinghouse Elec. & Mfg. Co.

Cutouts
G & W Elec. Specialty Co.
General Elec. Co.
James R. Kearney Corp.
Line Material Co.
W. N. Matthews Corp.
Pacific Elec. Mfg. Corp.
Schweitzer & Conrad, Inc.
Westinghouse Elec. & Mfg. Co.

Demand Control
General Elec. Co.
Wesix, Inc.

Distribution Specialties
G & W Elec. Specialty Co.
General Elec. Co.
Hubbard & Co.
James R. Kearney Corp.
Maydwell & Hartzell, Inc.
Ohio Brass Company
St. Louis Malleable Casting Co.
Superior Switchboard & Devices Co.

Electrodes, Arc Welding
General Elec. Co.
John A. Roebling's Sons Co.

Enclosures, Meter and Instrument
Superior Switchboard & Devices Co.

Fans
General Elec. Co.
Kisco Co., Inc.
Smallcomb Elec. Co.

Farm Electrification Equipment
General Elec. Co.

Fittings, Conduit
General Elec. Co.
B. Hartman
Killark Elec. Mfg. Co.

Fittings, Insulator
Brewer-Titchener Corp.
Ohio Brass Company

Fixtures, Lighting
Benjamin Elec. Mfg. Co.
Curtis Lighting, Inc.
General Elec. Co.
Pittsburgh Reflector Co.
Smoot-Holman Co.
Westinghouse Elec. & Mfg. Co.

Floodlighting
Curtis Lighting, Inc.
General Elec. Co.
Pittsburgh Reflector Co.
S & M Lamp Co., Inc.
Smoot-Holman Co.
Westinghouse Elec. & Mfg. Co.

Generators
Allis-Chalmers Mfg. Co.
General Elec Co.
Westinghouse Elec. & Mfg. Co.

Graphite Products
National Carbon Co., Inc.
Union Carbide & Carbon Corp.

Ground Rods
Maydwell & Hartzell, Inc.

Heaters, Air
Edison Gen. Elec. Appliance Co.
Noblitt-Sparks Industries, Inc.
Thermador Elec'l Mfg. Co.
Wesix Elec. Heater Co.
Edw. L. Wiegand Co.

Heaters, Water
Edison Gen. Elec. Appliance Co.
Electro Hot Heater Co.
Standard Elec. Mfg. Corp.
Thermador Elec'l Mfg. Co.
Wesix Elec. Heater Co.
Westinghouse Elec. & Mfg. Co.
The Woolwine-Norris Corp.

Heating Element—Repair Part
Edw. L. Wiegand Co.

Instruments, Measuring and Recording
See Ammeters, Voltmeters, Wattmeters.

Insulation
General Elec. Co.
Irvington Varnish & Insulator Co.
Johns-Manville Corp.

Insulators
Brewer-Titchener Corp.
Corning Glass Works
Graybar Elec. Co., Inc.
Hemingray Glass Co.
Geo. E. Honn Co.
Lapp Insulator Co., Inc.
Locke Insulator Corp.
Maydwell & Hartzell, Inc.
Ohio Brass Company
Owens-Illinois Glass Co.
Westinghouse Elec. & Mfg. Co.

Ironers
Easy Washing Machine Corp.
Edison Gen. Elec. Appliance Co.
General Elec. Co.
Norge Division, Borg-Warner Corp.
Westinghouse Elec. & Mfg. Co.

Knobs, Tubes, Cleats
Standard Elec'l Porcelain Mfrs.

Lamp Guards
McGill Mfg. Co.

Lamp Replacers
G. C. A. Mfg. Co.

Lamps, I. E. S.
General Elec. Co.

Lamps, Mazda
General Elec. Co.
Westinghouse Lamp Co.

Lamps, Sun
General Elec Co.

Lighting Equipment
Benjamin Elec. Mfg. Co.
Curtis Lighting, Inc.
Kim Mfg. Co.
Smoot-Holman Co.
Westinghouse Elec. & Mfg. Co.
Wuelker Lighting Co.

Line Material
Maydwell & Hartzell, Inc.
Ohio Brass Company

Meters
General Elec. Co.
Lincoln Meter Co.
L. A. Nott
Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec'l Instrument Corp.

Motors
Allis-Chalmers Mfg. Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Motor Starters
Allis-Chalmers Mfg. Co.
General Elec. Co.
Square D Co.
Westinghouse Elec. & Mfg. Co.

Oil, Lubricating
Shell Oil Co.
The Texas Co.

Oil, Transformer & Switch
General Elec. Co.
Shell Oil Co.
The Texas Co.

Panel Boards
General Elec. Co.
Square D Co.
Superior Switchboard & Devices Co.
Westinghouse Elec. & Mfg. Co.

Photoelectric Cells
General Elec. Co.
Weston Elec'l Instrument Corp.

Pins, Wood
Locust Pin Co.

Pole Line Hardware
Brewer-Titchener Corp.
General Electric Supply Corp.
Graybar Electric Co., Inc.
Hubbard & Company
Joslyn Co. of California
Kortick Mfg. Co.
Maydwell & Hartzell, Inc.
Ohio Brass Company

Porcelain
Standard Elec. Porcelain Mfrs.

Public Utilities
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Idaho Power Co.
The Montana Power Company
Mountain States Power Co.
Northwestern Electric Co.
Pacific Gas and Electric Co.
Pacific Power & Light Co.
Portland General Electric Co.
Puget Sound Power & Light Co.
San Diego Cons. Gas & Elec. Co.
San Joaquin Light & Power Corp.
Southern California Edison Co. Ltd.
Utah Power & Light Co.
Washington Water Power Co.

Pullers, Stack
A. B. Chance Co.

Pumps
Pelton Water Wheel Co.

Range Units
Edison Gen. Elec. Appliance Co.
Edwin L. Wiegand Co.

Ranges
Edison Gen. Elec. Appliance Co.
General Elec. Co.
General Elec. Supply Corp.
Kelvinator Corp.
Landers, Frary & Clark
F. S. Lang Mfg. Co.
Malleable Iron Range Co.
Norge Division, Borg-Warner Corp.
Standard Elec. Mfg. Corp.
Westinghouse Elec. & Mfg. Co.
The Woolwine-Norris Corp.

Reflectors
Benjamin Elec. & Mfg. Co.
Curtis Lighting, Inc.
Pittsburgh Reflector Co.
Reflector & Illuminating Co.
Smoot-Holman Co.
Westinghouse Elec. & Mfg. Co.
Wuelker Lighting Co.

Refrigerators
Edison Gen. Elec. Appliance Co.
Frigidaire Corp.
General Elec. Co.
General Elec. Supply Corp.
Graybar Elec. Co., Inc.
Kelvinator Corp.
Leonard Refrigerator Co.
Norge Division, Borg-Warner Corp.
Westinghouse Elec. & Mfg. Co.

Relays
General Elec. Co.
Hart Mfg. Co.
Roller-Smith Co.
Square D Co.
Ward Leonard Elec. Co.

Rheostats & Resistors
General Elec. Co.
Ward Leonard Elec. Co.
Westinghouse Elec. & Mfg. Co.

Roasters
National Enameling & Stamping Co.
Westinghouse Elec. & Mfg. Co.

Rural Line Hardware
General Elec. Supply Corp.
Graybar Elec. Co., Inc.
Hubbard & Co.
Joslyn Co. of Calif.
Kortick Mfg. Co.
Maydwell & Hartzell, Inc.
Ohio Brass Company

Service Organizations
Brookmire Corp.
Crocker First National Bank
Elec'l Testing Labs.
McGraw-Hill Book Co.
Northwest Elec. Light & Power Association
Pacific Coast Elec'l Bureau
Pacific Coast Elec'l Ass'n

Strand, Guy
Maydwell & Hartzell, Inc.
Pacific Wire Rope Co.

Street Lighting Fixtures
General Elec. Co.
Graybar Elec. Co., Inc.
Hubbard & Co.
Line Material Co.
Westinghouse Elec. & Mfg. Co.

Switchboards
Allis-Chalmers Mfg. Co.
General Elec. Co.
Roller-Smith Co.
Square D Co.

Switches, Disconnect
Electric Power Equip. Corp.
General Elec. Co.
Kearney Corp., James R.
Line Material Co.
Pacific Elec. Mfg. Corp.
Schweitzer & Conrad, Inc.
Westinghouse Elec. & Mfg. Co.

Switches, Fuse
General Elec. Co.
Kearney Corp., James R.
Pacific Elec. Mfg. Corp.
Schweitzer & Conrad, Inc.

Switches, Heater
General Elec. Co.
Hart Mfg. Co.

Switches, High Tension
Bowie Switch Co.
James R. Kearney Corp.
Pacific Elec. Mfg. Co.

Switches, Meter Test
General Elec. Co.
Square D Co.
Superior Switchboard & Devices Co.

Switches—Pressure and Temperature
Square D Co.

Switches, Safety
Colt's Patent Fire Arms Mfg. Co.
General Elec. Co.
McGill Mfg. Co.
Square D Co.
Westinghouse Elec. & Mfg. Co.

Switches, Thermostat Controlled
Colt's Patent Fire Arms Mfg. Co.
General Elec. Co.
Hart Mfg. Co.
Thermador Elec'l Mfg. Co.

Switches, Time
General Elec. Co.
Maydwell & Hartzell, Inc.
Sangamo Elec. Co.

Switchgear
Allis-Chalmers Mfg. Co.
General Electric Co.
I-T-E Circuit Breaker Co.
Westinghouse Elec. & Mfg. Co.

Tapes—Friction and Rubber
Clifton Mfg. Co.
Geo. E. Honn Co.

Telephone & Telegraph Hardware & Specialties
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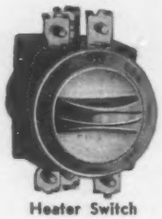

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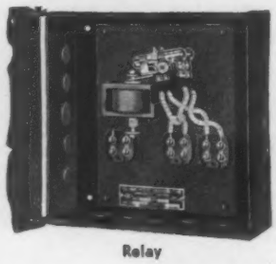

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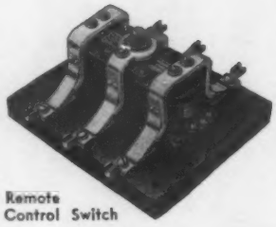

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● INDEX TO ADVERTISERS

FEBRUARY, 1938

Allis-Chalmers Mfg. Co. 26
Aluminum Company of America 18

Bartlett Mfg. Co. 93
Brewer-Titchener Corp. 27
Brookmire Corporation 93
Burndy Eng'g Co., Inc. 90

California Oregon Power Co. 66, 67
Colt's Patent Fire Arms Mfg. Co. 20
Columbia Steel Co. 21
Crescent Ins. Wire & Cable Co. 3
Crocker First National Bank 89

Everstick Anchor Co. 94
Ferranti Electric, Inc. 98

Gardner Elec. Mfg. Co. 91
G.C.A. Mfg. Co. 98
General Cable Corp. 79
General Electric Co. 2, 5, 7, 16, 34, 83, 86, 95

Hart Mfg. Co. 100
Honn Co., Geo. E. 94

Idaho Power Co. 66, 67
Indiana Steel & Wire Co. 88

Jeffries Transformer Co. 93
Johns-Manville Corp. 24, 25

Kelvinator Division, Nash-Kelvinator Corp. 14, 15
Klein & Sons, Mathias 84
Kortick Mfg. Co. 90

Lapp Insulator Co., Inc. 17
Lincoln Meter Co. 88
Locke Insulator Corp. 19

Maydwell & Hartzell, Inc. 94
McGraw-Hill Book Company, Inc. 99
Montana Power Company, The 66, 67

Nash-Kelvinator Corp. 14, 15
National Carbon Co., Inc. 4

Ohio Brass Company 32, 33
Okonite Company, The 8
Okonite-Callender Cable Co., Inc. 8
Owens-Illinois Glass Co. 9

Pacific Coast Electrical Bureau ..... Back Cover
Pacific Electric Mfg. Corp. 28, 29
Pacific Gas and Electric Co. ..... Inside Back Cover
Pacific Power & Light Co. 66, 67
Pelton Water Wheel Co. 87
Pittsburgh Reflector Co. 23
Portland General Electric Co. 66, 67
Professional Directory 93
Puget Sound Power & Light Co. 66, 67

Reliable Electric Co. 82
Roebling's Sons Co., John A. 85
Roller-Smith Company 91

Sangamo Electric Co. 89
Southern California Edison Co., Ltd. ..... Inside Front Cover
Square D Company 31
Standard Electric Mfg. Corp. 90
Superior Switchboard & Devices Co., The 81

Triangle Conduit & Cable Co., Inc. 6

Union Carbide & Carbon Corp. 4
United States Steel Corp. 21
Utah Power & Light Co. 66, 67

Washington Water Power Co. 66, 67
Westinghouse Electric & Mfg. Co. 10, 11, 12, 13, 30
Weston Elec. Instrument Corp. 22
Wiegand Co., Edwin L. 89

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